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SIMILARITIES AND DIFFERENCES BETWEEN ADOLESCENT MONOZYGOTIC AND DYZYGOTIC TWINS' QUALITY OF THE SIBLING RELATIONSHIP

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SIMILARITIES AND DIFFERENCES BETWEEN ADOLESCENT MONOZYGOTIC AND DYZYGOTIC TWINS' QUALITY OF THE SIBLING RELATIONSHIP

by

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Dedication

To God and His Holy Spirit, who has continually guided me and given me strength to discern His purpose for me.

To my husband, Kevin, and my four children, William, Mary Kevan, Maynard, and Christopher. who support me, love me, keep me laughing, and help me keep life in perspective.

To moms, of singletons and twins, you can raise a family while getting a doctorate.

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Similarities and Differences Between Adolescent Monozygotic and Dyzygotic Twins' Quality of the Sibling Relationship

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This study examined the similarities and differences in the adolescent monozygotic (MZ) twin and same-sex dyzygotic (DZss) twin sibling relationship. Specific constructs investigated were: companionship, empathy, directiveness/teaching, avoidance, rivalry, and aggression. Participants included 192 same-sex twin pairs, age 9 – 18, and their biological parents. The data is part of a national study from the Non-Shared Environment in Adolescent Development Project. The nationally representative data set provided a measure of the *Sibling Inventory of Behavior – Expanded Version* (Anderson & Rice, 1999), whereby each participant individually responded to the paper-pencil questionnaire. Twinship status differences, gender differences, reporter differences and reporter by twinship interactions were examined.

The results found significant differences between MZ twins and DZss twins on the constructs of empathy, companionship, avoidance, rivalry, and aggression. MZ twins demonstrated and reported higher levels of empathy and companionship and lower levels of avoidance, rivalry, and aggression, when compared to DZss twins. There was no interaction effect of twinship by gender, except on directiveness/teaching; however, significant differences were found between male MZ/DZss twins and female MZ/DZss twins on the constructs of empathy, companionship, directiveness/teaching, and avoidance. Female MZ/DZ twins reported and demonstrated higher levels of empathy, companionship, and directiveness/teaching, and lower levels of avoidance. Overall, there were no reporter differences between twins on any of the six constructs. There were significant differences between parental perceptions and twin perceptions on empathy, companionship, directiveness/teaching, rivalry and aggression. A significant difference between mothers and fathers was found on the constructs of empathy and avoidance. On the construct of avoidance, mothers and fathers differed from each other, however, fathers did not differ from the twins. There was no twinship by reporter interaction effect, except on directiveness/teaching.

Overall, the results suggest that MZ twins report and are perceived as having a more positive relationship than DZss twins. The results also support the need for multi-reporter research in order to obtain a truer picture of the family relationship. The gender findings further extend the understanding of the role of gender in the sibling relationship. Lastly, due to the paucity of twin research, the results aid in the development of a framework for understanding the adolescent twin relationship.

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CHAPTER 1: INTRODUCTION

Twins have been instrumental in providing insight into the role of genetics and environment in such areas as intelligence (e.g. Erlenmeyer-Kinling & Jarvik, 1963; Shields, 1962; Vernon, 1960; Willerman, 1979; Wilson, 1983) and illness (e.g. Ainsle, 1993; Baker, Reynolds, Phelps, 1992; Boklage,1987; Bracha, 1986; Keith & Brown,1970; Kindler, 1993; Lykken, McGue, Tellegen, Bouchard, 1992; Lykken, McGue, Tellegen, 1993; Segal, 1990). However, researchers have not provided as much to twins, as twins have imparted to science. In 1980 there were 68,339 twin births in the United States; in 2004 there were 132,219 twin births, an increase of 70% (CDC, 2006). Medical technological advances in fertilization techniques, women waiting to have children, as well as advances in treatment of premature babies has created a scenario whereby more women are giving birth to twins, and more neonate twins are surviving. Medical advances have been life producing and life saving for twins, but they have not been met with concomitant advancements in understanding the social, emotional, and psychosocial development of twins.

The increase in successful twin births has been an impetus for studies examining the effects of the birth of twins on the family, especially in the area of parental stress (Hay, Gleeson, Davies, Lorden, Mitchell, Paton; 1990; Malmstrom, Faherty, Wagner, 1988; Noble, 1980; Robin, Cahens, 1992; Weigel, Auxier, & Frye, 2000) with regards to finances (Chang, 1990; Weigel, Auxier, & Frye, 2000;), sharing of responsibilities (Chang, 1990; Robin, Josse, Tourrette, 1988), loss of career options (Noble, 1980;

O'Brien, Hay, 1983), depression (Chamberlain, Lumley, 1986; Chang, 1990; Goshen-Gottstein, 1980; Hay, O'Brien, 1984) drug and alcohol abuse (Goshen-Gottstein, 1980; Leonard, 1985; Malmstrom & Biale, 1990; Nelson & Martin, 1985; O'Brien & Hay, 1983) and divorce (Fishbein, Hallencreutz & Wiklund, 1990; Goshen-Gottstein, 1980; Hay et al., 1990). Researchers of twins have also focused their efforts on the neonate, infant and young twins' challenges with language development (Dodd & McEnvoy, 1994; Hay, Prior, Collett & Williams, 1987; Levi & Bernabei, 1976; Lytton, Conway & Sauve, 1977; Lytton, Jagjit & Gallagher, 1995; McMahon, Stassi & Dodd, 1998; Mittler, 1970; Mogford-Bevan, 1999; Munsinger & Douglas, 1976; Savic, 1980; Sandbank & Brown, 1990) and other physical limitations (Bryan, 1999; Buckler, 1999; Burton & Bryan, 1995; Grether, 1993; Hay & Tan, 1990; Little & Bryan, 1988; Malmstrom & Biale, 1990) due to prematurity and sharing of the womb. Understandably, issues of birth defects, language delays and the parenting of twin newborns are important to both the family and the twins, but as twins continue to mature, other issues of development need to be addressed, understood, and negotiated, including the very nature of the twin relationship.

Little is known about the development of twins (Ainslie, 1985), and yet twinship constitutes its own developmental context (Ainslie, 1985; Farber, 1981); therefore, there is a need for a conceptualization of twin development (Farber, 1981). One area of development that needs attention is the area of adolescence. Scheinfeld (1973) suggests that adolescence is a pivotal time for twins. Ainslie (1985) supports this assumption by proposing that there are three times in the life of twins that are especially stressful: infancy, fifteen to twenty four months of age, and adolescence. Since a majority of the

research currently focuses on the two earliest ages, it is imperative that research delve into the third area of potential stress, adolescence.

When exploring twins and their development, it is essential that it be recognized that the term “twins” does not designate a homogeneous group (Hay, 1999). “Twins” is a heterogeneous group consisting of: female-female monozygotic (MZ) twins, female-female dyzygotic (DZ) twins, male-male MZ twins, male-male DZ twins, and male-female DZ twins. Although the there are five subgroups, few researchers distinguish the differences and the implications of these differences. Therefore, the proposed study is an exploratory study focusing specifically on MZ twins and DZ twins. In order to decrease the confounding factor of having different genders within the same relationship, the study is limited to same-sex twin siblings.

The present study was designed to investigate the similarities and differences of the adolescent relationship of same-sex adolescent DZ and MZ twins. Since there is a scarcity of research investigating any aspects of the adolescent sibling twin relationship, then the primary goal of this student is to explore aspects of the twin relationship by comparing DZ and MZ adolescent twins. In order to gain a more in-depth understanding of the twin relationship, reports obtained from mothers and fathers will be obtained as well as reports from the individual twins within each twin dyad. A secondary goal is to add to the understanding of gender differences which may play a role in the twin relationship. Therefore the study will also investigate possible differences between female-female dyads and male-male dyads.

OUTLINE OF THE DOCUMENT

This dissertation will focus on the relationship between single-sex MZ and DZ adolescent twins. The first portion of Chapter 2 will discuss the literature concerning twins, in general, concluding with zygosity specific research presented near the end of section one. Since there is limited research in the area of the development of the twin sibling relationship, it was necessary to obtain information from the general area of sibling research in order to obtain a base understanding of sibling relationships. Therefore the second section in Chapter 2 will focus on the research concerning the development and understanding of the sibling relationship in general.

A majority of the writings that consider issues of twinship and twins are most often based on either case studies (Burlingham, 1952; Demarst & Winestine, 1955; Joseph & Tabor, 1961; Leonard, 1961) or interviews (Ainslie, 1985; Klein, 2003; Scheinfeld, 1973; Siemon, 1980). Although case studies can be an important starting point for research, early case studies of twins included individuals who possessed confounding variables other than the variable of twinship. For example, one author based her findings of psychopathology in twins on adult twins who were orphaned and raised in "The Homestead" nursery in England during World War II (Burlingham, 1952). Other writers utilized adult twins who were clinical cases in their psychoanalytic practice (Joseph & Tabor, 1961). The studies based on interviews have methodological problems as well, in that they appear primarily qualitative in nature. While such strategies can be important for theory generation, they do not provide a basis for comparing the normative experience of twin relationships. Moreover, the interviews often included primarily adults, who were asked to give a retrospective account of their adolescent years rather

than adolescents who are living the experience. Lastly, quite often conclusions were drawn about the twins, specifically, and their relationship based upon the interview of only one twin in the pair. When empirical studies are conducted, the studies often do not use comparison groups or multiple informants. Therefore, this study will include reports from parents as well as from each adolescent twin.

Although there are issues and concerns with prior twin research, some of the findings do offer insight into twins and their thought processes. Unfortunately, prior research gives little assistance in offering a point of reference for understanding the development and nature of the adolescent twin relationship. Therefore it is necessary to utilize another venue for gaining an understanding of the adolescent twin relationship. Since twins are siblings, then it is possible to gain further insight into the twin relationship by looking at the adolescent nontwin sibling relationship. Although it is impossible to draw firm conclusions concerning the twin relationship from the nontwin sibling relationship, the information obtained can offer a spectrum of behaviors on which to explore the adolescent twin relationship. Therefore the second topic of the literature review involves research on the adolescent nontwin relationship. It is from these established developmental concepts concerning adolescent nontwin sibling relationships that the basis of comparison is drawn.

More twins will be entering the school system, thereby creating a scenario whereby more teachers, counselors and school psychologist will become part of the twin and parent support system. Therefore, it is imperative more empirical research be completed. It is incumbent upon researchers to investigate the period of adolescence from the unique perception of twinship. The questions that parents, teachers, school

boards, pediatricians, and others ask about adolescent twins must be met with empirically based data that includes not only reports from the twins themselves, but also the parents. The information from this study will help answer those very basic and rudimentary, but important questions such as: How does the quality of the adolescent twin relationship differ between DZ twins and MZ twins? How do same-sex MZ and DZ twins differ with regards to the sibling relationship? Are there differences in perception between MZ twins a DZ twins with regards to their relationship?

Twin research can be very promising. Research concerning twins can offer insight into several relationships. Segal (1999) noted that twins can give insight into the social relationships of families, "inform us about family attachments (p.95)," as well as "provide insights into what it takes to get along with others" (p.95).

CHAPTER 2: REVIEW OF THE LITERATURE

TWIN STUDIES

Since the earliest times, twins have constituted a mystery, an interest and a curiosity. In the 1800's, Sir Frances Galton wrote (1875), Hereditary Genius: An Inquiry into its Law and Consequences. This work is known as the beginnings of twin research and the classical twin method. Historically, the impetus for twin research has been the nature versus nurture debate (i.e. Kallman, 1948; Newman, et al, 1937; Vandenberg, 1964, 1966). The research gathered has been extremely useful in discerning information concerning the role of genetics to behavior. Ainslie (1985) notes, "Twinship has provided psychologists with an immensely rich source of information for understanding human behavior" (p. 1). With the plethora of information relating to the genetics and environment of twins and how twins help explain individual development, it is interesting to realize that there is far less information concerning the development of twins and their relationship. In fact, Arlow (1960) noted that the studies being conducted were not studies *about* twins, but rather studies *on* twins. Novotony (1988) confirmed Arlow's idea by stating, "Twins have often served science, but science has rarely served twins" (p. 15).

EARLY HISTORY OF RESEARCH ON TWINS

While geneticists were utilizing the twin relationship in order to explore heredity issues, several psychoanalysts were concerned about the twins with whom they were in contact. The psychoanalysts began their own line of inquiry into the effect of being a twin on the twins themselves. The earliest studies on twinship were based on psychoanalytic theory of development (Burlingham, 1952; Cronin, 1933; Demarst & Winestein, 1955;

Joseph & Tabor, 1961; Leonard, 1961). Leonard (1961) noted that although the cultural attitude "emphasizes the positive aspects about having twins" (p. 302), the overall findings suggests twins are limited in their personality development, and in fact may face special problems in their development, due solely to the fact they are twins. Leonard (1961) stated that, "In the case of every twin whose analysis has been reported, the twin relationship was considered the prime reason for that individual's emotional disturbance" (p.301). Burlingham (1952) pointed out that twins' inability to see themself with a separate identity is very damaging. She also noted that twins often seem to represent two sides of one personality in order to make one well-balanced whole. Even though Slater and Shields (1953) found that there was no greater percentage of twins in mental hospitals, as compared to the percentage of twins in the population as a whole, researchers surmised that the issue of intertwinning, which is reported as being responsible for twins' psychopathology, was also the issue that "masks the need for psychiatric intervention" (Leonard, 1961, p. 317).

The early studies were groundbreaking and important contributions to twin research, however, the studies conducted were limited in several areas. First, the studies were not empirically based, but were case studies, often consisting of only one case. Second, the studies incorporated primarily therapist observations. Third, the twins in the studies consisted of: (1) infants raised in homes in which the mother referred the children at the age of three years to the Council Child Development Center because of difficulties attributed, by the mother, to "twinness" (Demarst & Winestine, 1955); (2) adult twins who entered treatment because, one had anxiety issues, and the other felt that if his twin needed analysis, then "I must need it too" (Joseph & Tabor, 1961, p. 277); and (3) infant

and toddler twins who lived in the Hampstead Nursery, a residential home for children in England during World War II (Burlingham, 1952).

Contemporary Empirical Studies of Research on Twins

In order to get a more representative picture of twins and their relationship, researchers began utilizing more systematic studies. Koch (1966) suggested, "The problems of twins interactions with and influences on each other, as well as the effects of other unique biological and social forces that typically play upon twins are exceedingly complex" (p. ix-x). Koch's (1966) empirical study explored the relationship of twins, their closeness and the effects of closeness on twins' confidence, rivalry, and domination of one twin over another. The subjects of her study consisted of ninety pairs of twins fifty-nine to eighty-six months of age, equally divided between identical male pairs, identical female pairs, fraternal same-sex male, fraternal same-sex female, and fraternal opposite sex twins. The methods included administering paper-pencil tests as well as conducting parent and teacher interviews. Her findings did not coincide with prior ideas concerning twins. Koch (1966) did find identical and fraternal twins to be closer than nontwins; however, the bond did not have a restricting effect on the children's associations with others. It was noted that individual twins played well with their own friends as well as their siblings' friends. In fact, feelings of acceptance from siblings' friends were higher for identical twins than for fraternal twins and singleton siblings. Overall, she stated, "We have seen few grounds for alarm over the relation between intertwins closeness attitudes generally and the social development of the children" (p. 133). In fact, Koch (1966) found twinship often served to enhance the children's sense of

self worth and competence. In 1990, Pearlman investigated the issues of separation-individuation, self-esteem, object relations, and marital status and contentment with fraternal twins, identical twins, and nontwins over the age of eighteen years. Pearlman's (1990) findings support Koch's (1966) earlier findings that twins are closer than nontwins, but, again, Pearlman (1990) found that twins' closeness did not "constitute a developmental disadvantage" (p. 625). She found that separation-individuation, object relations, and self esteem were not significantly different for twins than for nontwins. Pearlman (1990) also found that adult twins did not suffer from an increase in marital problems, nor did they marry less often than nontwins, adding support to the findings that closeness does not hinder twins' nonfamilial relationships. Most recently, Klien (2003) interviewed adult twins in order to discern the impact of twinness on their current psychological and sociological states. Klein's findings converge with Koch (1966) and Pearlman (1990) in that overall, "All the twins with whom I spoke had positive thoughts and feelings about having a full-time companion and trustworthy friend." Overall, studies found that twins may help serve as buffers for each other from everyday upsetting situations (Klien, 2003), as well as from psychiatric trauma (Allen & Pollin, 1970). Also, twins' closeness does not interfere with social development, but rather enhances their ability to interact with others because of twins' propensity to being highly empathic beings (Shave & Ciriello, 1983).

Summary

Early researchers suggest being a twin limits one's personality (Burlingham, 1952; Leonard, 1961), damages their self-development (Demarst & Winestine, 1955);

and increases the chances of psychopathology (Joseph & Tabor, 1961; Leonard, 1961). Other researchers note that being twins does predispose one to psychopathology, nor lead to concerns in social development (Koch, 1966; Pearlman, 1990; Klein, 2003). Albeit prior research exploring psychological and social outcomes for twins has been inconsistent, a larger issue in the research is the fact that, overall, twin research ignores the heterogeneity of the classification of "twin." This study addresses the heterogeneity issue by including MZ and same-sex twins.

Research on the Quality of the Twin Relationship

Recently, with the rise in twin births, there has been an increase in research concerned with the uniqueness of twins, especially in the area of the affects of the birth of twins on the family unit. There has been empirical data noting an increase in divorce rate after the birth of twins (Fishbein, Hallencreutz, & Wiklund, 1990; Hay, Gleeson, Davies, Lorden, Mitchell, & Paton, 1990) and an increase in child abuse in families with twins (Groothuis, Altmeir, Robarge, O'Conner, Sandler, Vietze, Lustig, 1982). Data suggests that mothers of twins have an increased risk of anxiety and depression (Chang, 1990; Goshen-Gottstein, 1980; Hay et al., 1990). Research also suggests that fathers of twins are more likely than fathers of nontwins to succumb to drug and alcohol abuse (Malmstrom & Biale, 1990) after the birth of their twins. The negative findings concerning families giving birth to twins are evidence to suggest that families are aware of the increased demands of having twins and the potential negative outcomes of the birth, for the family. In fact, some research suggests compulsory counseling concerning

the impact of twins on lifestyle and career options for couples who are planning to undergo in-vitro fertilization (Hay et al., 1990).

Although the rise in twin births has been an impetus for an increase in research on twins and the family, and even twins, themselves, but the a majority of the research focuses on neonates, toddlers and young children. Researchers concentrate on the special needs of twins, such as language development (i.e. McMahon, Stassi, Dodd, 1998; Sandbank & Brown, 1990), and physical disabilities (Malmstrom & Biale, 1990). Some researchers have investigated the twin relationship with respect to the qualities that appear to be especially salient for twins, i.e. rivalry, competition, and power.

Researchers often extrapolate that twins are more rivalerous than nontwins simply because of the fact that from birth they have to compete for love and attention (Scheinfeld, 1973), especially from their mothers' (Hay, 1999; Preedy, 1999). Although a seemingly logical assumption, there is no research to support this supposition. Koch's (1966) empirical study found twins to exhibit less rivalry and less attention seeking than nontwins, with identical twins exhibiting the least rivalry when compared to fraternal twins and singletons. She attributes the reduced rate of rivalry in twins to the idea that identical twins are treated more similarly socially and behaviorally, which leads to less of a need for rivalry, competition or power struggles. Klein (2003) acknowledges that although there is some competition and rivalry between twins, the competition is adaptive and beneficial because the competition helps the twins define their individual strengths and differences. Ainslie (1985) further confirms Koch's findings in that he found that although twins are remarkably alike, "They are different in other respects and it is these differences through which twins achieve a nonconflictual sense of themselves as unique

and different" (p. 37). Competition and rivalry is a normal, beneficial, and imperative aspect of their relationship, in that it can help them define who they are as distinct individuals.

Intertwined within the dimensions of rivalry and competition is the concept of power and asymmetry within the relationship. The popular view is that within the twin relationship, each twin takes a specific role whereby one twin is the "dominant twin" and the other the "submissive twin." The role division of dominant and submissive is often related to the idea that for a twin to gain an independent identity, one twin must be assertive and domineering, while the other is acquiescent and docile. However, with regards to twins being able to establish their own identity, there are no findings to support the dominant-submissive concept (Koch, 1966). Koch's findings suggest that the asymmetry in the relationship is limited to particular areas of activity, and the roles of submissive and dominant shift depending on the particular event. Koch surmised that there was no more need for concern over the relationship of twins than among siblings in general, especially in the area of relative status and power. Scheinfeld (1973) also suggests that although there are times when one twin is the "dominant twin," the relationship replicates the *seesaw effect*; whereby when one twin is "up" in power, the other is "down," and the relative power switches when the twins feel it appropriate, based on skills, events, and activities.

The researchers exploring the twin relationship offer some insight into the quality of the twin sibling relationship, however, the findings are based on retrospective case studies (Ainslie, 1985; Klien, 2003) and research with young children (Koch, 1966), as well as focusing on the homogeneous group of twins. Few researchers investigate the

adolescent twin relationship and yet, the period of adolescence is a time of rapid biological and social changes.

Scheinfeld (1973) notes, “The various factors that may decide twin’s adult relationships come into sharp focus during adolescence.” He suggests adolescence may be the very time when twinship is under the greatest strain due to the fact that the tasks of adolescence involve searching for and achieving autonomy, individuality and independence (Erikson, 1968), but adolescent twins have the undertaking of not only breaking away from parental control, but also separating and individuating from their co-twin (Ainslie, 1985; Hay, 1999; Justice & Utesch, 1994; Klein, 2003; Schave & Schave, 1989; Scheinfeld 1973). Klein (2003) suggests that “as childhood comes to an end, the intense need for the twin is greatly diminished” (p.16). During adolescence, twins may rebel against being compared and contrasted with each other. They may embark on establishing an identity outside the twinship by finding new friends and interests, dressing differently (Klein, 2003), and concentrating on themselves rather than the twinship (Justice & Utesch, 1994). The process of individuation and separation may be riddled with feelings of guilt and vulnerability over losing a lifelong companion (Ainslie, 1985). Adolescent transitions may create problems within the twinship (Justice & Utesch, 1994), leaving many twins stressed and confused over the decisions of companionship and independence (Novotony, 1988).

Another difficult issue confronting adolescent twins is the new arena of dating and relationships with the opposite sex (Hay, 1999). Twins may have difficulty accepting that their co-twin is spending more time with their “romantic interest” (Hay, 1999; Sandbank, 1999). While at the same time, have difficulty sharing details of an “intimate”

relationship outside the twinship (Ainslie, 1985). However, other authors suggest that having a twin can be a buffer, especially during dating because they have someone with whom they can share their pain (Klein, 2003; Scheinfeld, 1973). Interestingly, the aspect of adolescence that involves dating can be very different for DZ twins and MZ twins. With the genetic differences between DZ twins, there is the possibility that the twins may mature and reach puberty at differing times, (Buckler, 1999; Furuscho, 1968; Hauspie, Bergman, Bielicki, & Susanne, 1994; Koziel, 1998; Shrama, 1983), thereby creating a barrier between the twins (Scheinfeld, 1973). As with many areas of twin research, there is little empirical research that sheds light on this issue and the information offered is inconsistent.

Although currently there are no empirical studies investigating the adolescent development of twins, researchers who have implemented retrospective interviews have uncovered some interesting aspects of individual twin relationships during adolescence (Ainslie, 1985; Klein, 2003; Schave & Schave, 1989; Scheinfeld, 1973). Ainslie (1985) found for some of the twin pairs he interviewed, adolescence was an extremely difficult transitional period. The concern most often voiced by adult's retrospective perception of their adolescence dealt with the decrease in companionship and lack of intimate sharing of information with their co-twin. Some twins reported that they began to question the nature of their intimacy, what they could and could not share. Interestingly, Ainslie's (1985) findings suggest that although a pair of twins may have both reported adolescence as a difficult time, their individual perceptions differed with respect to the reasons and age at which the twin relationship began to shift. When families as a whole are asked to report on the affects of adolescence on their family and the twin pair, an increase in

conflict is often mentioned (Rosambeau, 1987), however, the conflict is usually transitory and of a trivial manner (Hay, 1999). Families also report that by late adolescence, the conflict has resolved itself (Rosambeau, 1987). Although adolescence is a difficult time for many twin pairs, overall the twins navigate the storm well, often times drawing them closer together in that they encounter the same developmental issues at the same time (Scheinfeld, 1973). The twins also reported that even though they may have experienced difficulties in adolescence, and rivalries and jealousies may become intense (Scheinfeld, 1973), twins were still each other's "special counsel" on the important decisions (Klein, 2003), and often act as a buffer for each other in some of the more difficult social situations that occur during adolescence (Hay, 1999). After all, along with searching for independence, adolescence is also a period in which one searches for a close confidant, and twins can meet this need wonderfully (Scheinfeld, 1973).

It is not clear, however, the extent to which the experience of adolescence differs in the twin relationship. Ainslie (1985) notes that "twinship constitutes a specific developmental context which alters the usual circumstances governing development" (p. 163), but what is the developmental context of adolescent twins? Do differences in the quality of the sibling relationship differ depending on twin status?

Research on MZ versus DZ Twins

For most purposes, twins have been portrayed as a homogenous group; however in order to better understand the twin relationship, it is imperative the larger group of "twins" be divided into subgroups of monozygotic twins (MZ/identical) and dyzygotic twins (DZ/fraternal) (Hay, 1999; Segal, 1984). Unfortunately, subdividing twin groups is

an uncommon format for investigation; therefore, there is a shortage of studies exploring the possible differences between these subgroups (Hay, 1999). However, those researchers who explore the differences between subgroups have discovered interesting and important differences between the groups. The most explored between group differences are closeness and cooperation. Helmut von Bracken (1934) presented pairs of MZ twins and DZ twins with algebra problems, having them complete the problems on their own in separate rooms and in the same room. When the MZ twins were in the same room, the more skilled twin would wait for the less skilled twin to catch up, and when the twins were matched in ability, the pair would consciously synchronize their pacing so as to finish at approximately the same time. When DZ twins had differing ability levels, the more skilled showed no inclination to "wait" for the co-twin to catch up, and the less skilled twin became less motivated to even continue trying. When the twins were matched in ability, the DZ twins became rivals, several pairs making up answers in order to try to be the first finished with the task. Findings by Axelrod and Hamilton (1981), Segal (1984), and Charlesworth (1996) support von Bracken, in that MZ twins were found to exhibit greater restraint of selfishness in regards to their co-twin when compared to DZ twins.

Segal (1984, 1988, and 1999) found similar MZ twin and DZ twin differences in her studies on cooperation within twin pairs. Segal (1988) presented pairs of MZ twins and DZ twins with a puzzle and asked them to work together to complete the puzzle. The MZ twins positioned the puzzle more equally between them and shared pieces amongst themselves. DZ twins pulled the puzzle closer to them self, and pushing and shoving were typical behaviors exhibited by the fraternal twins. On another task, Segal (1984) had

young twins trace a shape as quickly as they could in order to earn points for themselves, then the outcome was shifted in that they were to trace the shape in order to earn points for their co-twin. Both the MZ twins and DZ twins worked harder for themselves, but the MZ twins worked significantly harder than the DZ twins for their co-twin. In a larger study, whereby 10-82 year old twins participated in the Prisoner's Dilemma Game, with age being equalized, there were significant differences between MZ twins and DZ twins. MZ twins displayed significantly more cooperative behaviors than DZ twins, with the DZ twins displaying more agitation with their co-twin (Segal & Hershberger, 1999). Segal (1999) noted that although some geneticists "argue that MZ twins 'intuit' their co-twin's behaviors more successfully than DZ twins, resulting in greater cooperation irrespective of their valuation of each other" (p.47). However, Segal's (1999) states, "knowing a person's tendencies does not guarantee cooperation" (p. 47). As a evolutionary psychologist, Segal (1999) surmises that MZ twins and DZ twins differences on cooperation would be related to the view that "benefits are more likely to be directed toward closely related kin than to more distantly related kin, as a mechanism for influencing representation of one's genes in future generations" (p. 148).

An additional explanation for MZ twins' exhibition of more cooperative behaviors with their co-twin can also be related to the idea that MZ twins have a closer bond than DZ twins; therefore displaying more cooperation, sharing, and empathic responses to their co-twin. In her study of young twins, Koch (1966) found that MZ twins reported greater social closeness to their co-twin than did DZ twins. Segal (1984) observed elementary age DZ and MZ twins on the playground during recess. She found that MZ twins displayed more physical and social closeness than DZ twins. It has also

been found that MZ twins have greater bereavement responses to the loss of their co-twin than do DZ twins (Segal, 1988, 1997a). In a study of high school-age twins, DZ twins and MZ twins, as groups, did not differ in their feelings about being a twin (Koehlin & Nichols, 1976), however a within pairs study found that identical twins were more likely to both be content with the twinship, but fraternal twin groups included more pairs where one was content with the relationship, and the other was not content (Freedman, 1979); again suggesting a positive and closer relationship between MZ twins. Scheinfeld (1973) found that MZ twins are more likely to be and stay close, with identical female twins having the greatest tendency to remain close overtime. Overall, closeness between twins appears to be influenced by whether the twins are identical or fraternal (Scheinfeld, 1973); however these results are based on studies of young children (Koch, 1966; Segal, 1984), limited interviews with a small sample (Koehlin & Nichols, 1976), reactions to the loss of a co-twin (Segal, 1988; 1997a), or based on third party observations of an in-lab task completion activity (Axelrod & Hamilton, 1981; Charlesworth, 1996; Segal, 1984; 1988, 1999; Segal & Hershberger, 1999, and von Bracken, 1934). There are no studies utilizing adolescent twins, both partners of the sibling relationship, or multiple measures. So, how do the qualities of the sibling relationship differ for MZ twins and DZ twins during adolescence? Do the perceptions of the quality of the adolescent sibling relationship the same or different for adolescent MZ twins and DZ twins?

Summary

Overall, studies specific to the twin relationship are conflicting and confusing. Some researchers suggest that during adolescence twins experience a need to individuate

and concentrate on themselves as individuals (Ainslie, 1973; Hay, 1999; Justice & Utesch, 1994: Klien, 2003; Schave & Schave, 1989). The need to look outside the twinship for friends, coupled with the potential outside "romantic" interests that may occur may cause adolescent twins to experience a decreased need of each other. Whereas other researchers suggest that the very fact that twins are undergoing physical and social changes may be cause for closeness to increase in that the twin has someone with whom they can empathize and share their experiences, both pleasant and painful (Klien, 2003; Schienfeld, 1973). In the area of conflict, families report that in early adolescence conflict increased, but was transitory and resolution occurred by late adolescence (Rosambeau, 1987). Retrospectively, twins reported that although rivalry and jealousy may have been high in adolescence (Schienfeld, 1973); they were each others special confidant on the important decisions (Klien, 2003). Overall, it is difficult to discern from these studies the actual qualities and patterns of the adolescent twin relationship. Therefore, the proposed study will explore the qualities of the twin relationship and how twins' perceive their relationship.

As mentioned earlier, prior studies exploring psychological outcomes for twins most often treated twins as a homogeneous group. However, in the area of the twin relationship, there has been some exploration into the similarities and differences between MZ twins and DZ twins. These studies have found that when MZ twins and DZ twins are given specific tasks, DZ twins are more likely than MZ twins to become competitive and agitated with their co-twin (Axelrod & Hamilton, 1981; Charlesworth, 1996; Segal, 1984; Segal & Hershberger, 1999, and von Bracken, 1934). MZ twins showed more cooperative behaviors and more care for the co-twins success (Segal, 1984;

1988; 1999). Although these studies offer insight to the twin relationship, the studies are task specific and often utilize the perspective of third party observers. Therefore, in order to gain a more complete understanding of the twin relationship, the proposed study will incorporate both twins' perspectives, in order to investigate the similarities and differences of the adolescent MZ twin and adolescent DZ twin relationship.

SIBLING RELATIONSHIP LITERATURE

The sibling relationship is unique in that it is not a voluntary relationship, but rather a relationship mandated by birth and terminated at death. The longevity of the relationship makes it a complex area of study, in that the relationship may be riddled with multifaceted situations affecting its life-long course, i.e. birth of other siblings, divorce of parents, and death of family members. Life itself, and the numerous life transitions that occur throughout the lifespan, effect and create each sibling union. Cicirelli (1985b) defines a sibling relationship as, "the total of the interactions (physical, verbal, and nonverbal communication) of two or more individuals who share knowledge, perceptions, attitudes, beliefs, and feelings regarding each other, from the time that one sibling becomes aware of the other" (p.4). Bank and Kahn (1982) define the sibling relationship as more than a composite of interactions, but rather a bond. Bank and Kahn (1982) "propose that the sibling bond is a connection between selves, at both an intimate and public level, of two siblings it is a 'fitting' together of two peoples' identities" (p.15). The sibling bond is a relationship that, although a subsystem of a larger family group, has its own special rules and effects (Bank & Kahn, 1982). Bank and Kahn note that it is through the sibling relationship that "one gets the sense of both being a distinct individual

and of constancy through knowing a sibling as a predictable person" (p.15). Siblings can be a source of companionship, help, and emotional support (Anderson, Buhrmester & Furman, 1985; White, 2001), and siblings influence one another's behavior, learning and development (Cicirelli, 1995; Dunn, 1992). Siblings are an integral part of one's social world, and comprise a salient, long lasting, socialization environment (Furman & Buhrmester, 1982; Lamb & Sutton-Smith, 1982). Siblings not only contribute to one's understanding of "the other" but also to one's self-definition (Newman, 1994). Siblings can aid in the development of self-disclosure skills (Howe et al., 2001), socio-emotional understanding (Howe et al., 2001; Slomkowski & Dunn, 1992), affective perspective-taking (Howe, 1991; Howe and Ross, 1990), and conflict resolution (Shantz & Hobart, 1989).

A Framework of the Sibling Relationship

As important a role as sibling relationship plays, sibling research is limited and sparse (Buhrmester & Furman, 1985; Cicirelli, 1992; Dunn and Kendrick, 1972; Newman, 1994; White & Lynn, 2001). One difficulty of sibling research is the lack of "accepted, global, psychological dimensions that are considered relevant, beyond those of jealousy and rivalry" (Dunn & Kendrick, 1972, p.85). In order to try to remedy the issue of a lack of qualifiable characteristics of sibling relationships, Buhrmester and Furman (1985) created a framework for studying sibling relationships. Buhrmester and Furman (1985) conducted research with fourth and fifth graders and learned that the most commonly mentioned positive qualities in a sibling relationship were, in descending order: companionship, admiration of sibling, prosocial behavior, and affection. The

salient negative qualities were antagonism and quarreling. Interestingly, they found that neither parental partiality nor competition was often discussed. Furman and Buhrmester (1985) then developed and validated a self-report questionnaire that assesses children's perception of the sibling relationship. Their subject pool consisted of 198 fifth and sixth graders. Their findings support four distinct, interpretable, factors: 1. Warmth/Closeness (intimacy, prosocial behavior, companionship, admiration, perceived similarity, affection) ; 2. Relative Power/ Status (degree and direction of asymmetry in the relationship, admiration, nurturance, and dominance) ; 3. Conflict (quarreling, antagonism,); 4. Rivalry (competition, perceived parental favoritism). These findings are consistent with findings from studies concerned with adult interpersonal relationships, with the exception of rivalry (Wiggens, 1979; Wish et al., 1976). Buhrmester and Furman's investigations were exploratory studies. More recently, other researchers have expanded the list of dimensions to include teaching/helping (Vandell, Minnett, and Santrock, 1987), validation (Cole, 2001), intimacy exchange/self-disclosure (Cole, 2001; Howe et al., 2000, 2001; McGuire, McHale, and Updegraff, 1996; Wu Shortt & Gottman, 1997), and empathy/emotional understanding (Howe et al., 2000, 2001; Wu Shortt et al., 1997).

Although the dimensions of quality within the sibling's relationship are stable, siblings themselves are not static (Buhrmester, 1992; Cicirelli,1995). The relationship reflects the developmental and transitional changes that occur as the siblings mature and progress through developmental periods (Buhrmester, 1992). "There are identifiable normative developmental changes that parallel, and are possibly causally linked to,

changes occurring in other spheres of youths' social lives" (Buhrmester & Furman, 1992, p. 36-37).

Status and Power And Teaching

One such developmental change is "best understood in terms of the changes of role structure" (Buhrmester, 1992, p. 19). Inherent within the sibling relationship are dichotomies and power struggles, dependent on an age-based hierarchical system. Some researchers argue that the sibling relationship, at least in childhood is asymmetrical (i.e. Brody et al., 1982; Dunn, 1983; Dunn & Kendrick, 1982). Children report that the older siblings have greater status and power than the younger siblings. The two complementary roles assumed in childhood create a situation whereby the older sibling is the teacher, manager, helper, and nurturer, and the younger sibling is the student, managee, and helpee (Abromovitch et al., 1986; Brody et al., 1982, 1985; Buhrmester & Furman, 1985b; Dunn & Kendrick, 1982; Hetherington, 1988; Vandell, Minnett, and Santrock, 1987). Cicirelli (1995) notes that "even though there may be issues of power or status, in a majority of cases there is usually equivalence in siblings' feelings of acceptance of each other which allows them to relate as equals" (p.2). Furman and Buhrmester (1985) suggest that depending on variables such as ordinal positioning, number of siblings in the family, and age spacing, the sibling union can be egalitarian or asymmetrical. From a developmental perspective, it has been found that the sibling relationship is less asymmetrical during middle childhood (Vandell et al., 1987) and by adolescence the relationship becomes more egalitarian (Buhrmester, 1992; Buhrmester & Furman, 1987,

1990). By the time the younger sibling reaches the age of 12 years, a milestone in the relationship has occurred. Buhrmester (1992) notes the following:

> The dyad most certainly feels emancipated from the often oppressive authority that parents had given the older sibling in the form of a dictate to 'look after' the younger. The older sibling is also likely to feel liberated by not being required to let the younger sibling 'hang out' with him or her. (p. 36)

Sibling Conflict and Rivalry

As issues of relative power and status within the sibling relationship mature, other dimensions are also affected by the maturation of the siblings. One characteristic that appears to be affected by developmental change is conflict. Cicirelli (1995) found that when siblings were asked to rate positive and negative qualities of their relationships in childhood, adolescence, and young and middle adulthood, enjoyment, trust, confiding, and understanding declined sharply in adolescence but increased in adulthood. Meanwhile, arguing, competition, rivalry, and antagonism rose to a peak in middle adolescence with a decline in late adolescence and adulthood. Siblings attributed the changes in the relationship to a general upheaval at that stage of life, and siblings not being as accepting of the other's changes in behavior and personality. Buhrmester and Furman's (1990) study with 3rd, 6th, 9th, and 12th graders suggest that conflict in adolescence diminishes and becomes less intense. They also found that the younger siblings noted more of a drop in conflict than the older siblings. Overall, the findings suggest that in late childhood to middle adolescence conflict increases, but a decline is

evidenced in late adolescence (Buhrmester, 1992; Buhrmester & Furman, 1987, 1990; Dunn et al., 1994; Vandell, Minnett, and Santrock, 1987). Several researchers contribute the decrease in conflict to the fact that as the siblings age, they spend less time with each other, thereby decreasing contact and interaction (Buhrmester, 1992; Buhrmester & Furman, 1987, 1990). Researchers have also found hat siblings that are close in age (two years or less) engage in more conflict than wider spaced siblings (Buhrmester & Furman, 1987, 1990; Cicirelli,1994b; Furman & Buhrmester, 1985a; Koch, 1966; Minnett et al., 1983; Newman, 1996; Wiech, 1990).

Although there is general consensus between researchers that conflict declines throughout the development of the sibling relationship, there is less agreement with regards to gender differences. Some studies have found that same-sex male sibling relationships have greater conflict (Brody et al., 1995; Graham-Bermannet et al., 1994; Hetherington, 1988; Volling & Belsky, 1992). Other researchers have found conflict to be unrelated to gender (Goodwin & Roscoe, 1990).

The lack of knowledge concerning the development of adolescent sibling relationship over the lifecourse creates some questions on how the relationship develops (Cicirelle, 1995). However there is no question that conflict is an inevitable and normal (i.e. Buhrmester, 1992; Cicirelli, 1989; Dunn & Kendrick, 1982b; Furman & Buhrmester, 1985; Montemayor & Hanson, 1985; Newman, 1994; Raffaelli, 1992; Steinmetz, 1977) aspect of all sibling relationships. Conflict, within the sibling relationship, has been found the have potential benefits (Bank & Kahn, 1982; Grotevant & Cooper, 1986). Conflict can help one learn and practice open communication, express feelings, and problem solve (Bank & Kahn, 1982; Brody, 1998). Researchers have found that a balance of

conflict and warmth in the sibling relationship is related to social-cognitive and behavioral competencies and to peer relationships and school adjustment (Brody, 1998; Hetherington, 1988). It has been found that when the conflict and warmth were high amongst male siblings, teachers rated the boys as having more positive peer relationships and less externalizing problems (Hetherington, 1988). McGuire, McHale, and Updegraff, (1996) found that relationships high in warmth and conflict were perceived by the siblings as more positive. A close relationship is not contingent upon the absence of negative affect and conflict (Wu Shortt & Gottman, 1997). Overall, the more affectively intense relationships were more positive and less likely to compromise psychosocial development (Brody, 1998) than those characterized with low levels of warmth and high hostility. It appears that warmth provides a context for sibling hostility and changes the meaning of a possibly negative relationship (McGuire et al., 1996).

Sibling Companionship, Intimacy, and Warmth

Although there are still questions about conflict in the sibling relationship, the dimension of companionship appears to have more congruent findings regarding the developmental changes throughout the sibling relationship. Researchers found that siblings are important sources of companionship for young children (Dunn & Kendrick, 1982; Ellis, Rogoff, & Cromer, 1981) and preadolescents (Furman & Buhrmester, 1985a). Vandell, Minnett, and Santrock (1987) also found that as late as 11 years of age, siblings were an important source of companionship. However, as adolescents mature, they search for autonomy, independence and individuation (Bowen, 1976; Erikson, 1957). Throughout the transitional process of developing personal autonomy,

adolescents seek to differentiate from parents, as well as resolve issues of independence from their siblings (Pulakos, 2001; White, 2001). The psychological transition from childhood to adolescence is reflected in the sibling relationship by an increased investment in peer relationships and a decrease in interaction with siblings (Buhrmester & Furman, 1987; Furman & Buhrmester, 1989; Raffaelli & Larson, 1987). The decrease in time spent together is evidenced in the sibling relationship by the decrease in companionship between siblings (Buhrmester & Furman, 1990). Overall, the findings suggest that as siblings' progress from middle childhood to adolescence, their desired source for companionship begins to switch from family members, including siblings, to same-sex peers, and in early adolescence peers are perceived as more important companions than parents and siblings (Buhrmester & Furman 1987; Pulakos, 2001). Although companionship may decrease, overall, warmth between siblings does not necessarily decrease. As siblings age, their relationships with friends may become more important , but siblings are likely to express their closeness with siblings by doing favors, providing emergency help, and by "just knowing we are close without having to talk about it" (Floyd, 1995, p.200).

The dimension of warmth/closeness, is complex and is best understood by exploring the variables that comprise the dimension. Siblings "are well placed to become confidants given the unique reciprocal (mutual sharing and playing) and complementary (instrumental support) features of their relationship" (Hinde, 1979) in addition to their shared environment and affective history. Even though, in adolescence, there is a decline in companionship, the emotional attachment between siblings remains strong throughout adolescence (Floyd, 1995; Weiss, 1974). Parents are the main source for sharing

information, for younger school-aged children. During middle childhood, siblings are an important source of intimacy (Buhrmester & Furman, 1987; Furman & Buhrmester, 1984b). Buhrmester and Furman (1990) found that as early adolescents individuate from family members, intimacy, affection, and admiration displayed relatively modest age related decrements, but in middle to late adolescence, increases in intimacy between siblings were found (Buhrmester, 1992; Buhrmester & Furman, 1990, 1992). Updegraff (2002) also found an increase in intimacy in sibling relationships, especially with the 13.5-14.5 age group. When a sibling felt close feelings and warmth about their sibling , they were more likely to turn to them for information as well as emotional support (Howe et al., 2000). Siblings disclose how they are similar and different in relation to both cognitive and emotional states, and there is a reciprocal exchange whereby knowledge regarding internal states is essential to the siblings sharing information (Howe et al., 2001). Researchers have found that an important predictor of adolescent adjustment is perceived support in relationship with significant others, including siblings (Garnefski & Dieksta, 1996; Levitt, Guacci-Franco & Levitt, 1993). Adolescence report that receiving emotional support, acceptance and a convergence of ideas and ideals from their siblings aided in their perception of support thereby aiding in their overall adjustment (Scholte, et al., 2001). Studies that find that narrower spaced siblings report being closer and warmer, also found that closer spaced siblings share more intimacies (Buhrmester & Furman, 1987). Howe et al (2001) notes that since siblings often have overlapping social worlds, go to the same school, know each other's friends and participate in similar activities, than an increase in warmth, closeness and intimacies are reported. Overall, siblings were found to be important and relatively stable recipients for disclosure, thereby implying

strong emotional support and warmth within the sibship, across both middle childhood and early adolescence (Buhrmester & Furman, 1987; Buhrmester, 1992).

As with conflict, there appears to be family constellation and gender effects in relation to warmth and emotional intimacy. Buhrmester and Furman (1990, 1992) found greater warmth between same sex siblings, especially if they were also close in age. Same sex sibling dyads also reported higher levels of intimacy (Buhrmester & Furman, 1990; Buhrmester, 1992). Although same-sex dyads reported more intimacy and closeness, there appears to be no gender issues as to whether female sibships confided more than male sibships, or visa versa (Howe et al., 2001).

Summary

In studying siblings and the sibling relationship, researchers began to realize the necessity of discerning what qualifiable dimensions define the characteristics of the sibling relationship (Buhrmester & Furman, 1985; Dunn & Kendrick, 1972). In answering the need, researchers found that there are several salient factors that portray the sibling relationship. Furman and Buhrmester (1985) found warmth/closeness, relative power/status, conflict, and rivalry to be salient in their study of fifth and sixth graders. Further studies have found, that along with the aforementioned characteristics, other distinct factors that define the sibling relationship are: teaching/helping (Vandell et al., 1987), validation (Cole, 2001), intimacy exchange/self-disclosure (Cole, 2001; Howe et al., 2000, 2001; McGuire et al., 1996; Wu Shortt & Gottman, 1997), and empathy/emotional understanding (Howe et al., 2000, 2001; Wu Shortt et al., 1997). The current study utilizes the understanding of the qualities of the sibling relationship in order

to explore the similarities and differences between adolescent MZ twins and adolescent DZss twins.

The current study is an exploratory study which investigates the MZ and DZss twin relationship looking at the constructs of empathy, companionship, directiveness/teaching, avoidance, rivalry, and aggression. The study will also examine the role of gender in the MZ/DZss relationship. Lastly, this study hopes to begin to formulate a theory as to how to conceptualize a framework for understanding the twin relationship.

RESEARCH STUDY

Although questions still abound concerning the adolescent sibling relationship, research offers insight into patterns and qualities of the adolescent sibling relationship. Knowledge concerning qualities of the sibling relationship, along with patterns evidenced in development of the sibling relationship offer a base for exploring the adolescent twin sibling relationship. The current study aids in creating a more complete understanding of the sibling relationship of adolescent twins, and how individuals perceive the relationship.

Research Questions and Hypothesis

Research Question 1: Are there significant twinship status differences, gender differences, reporter differences or reporter by twinship interactions on the construct of empathy, as measured by the *Sibling Inventory of Behavior – Expanded Version* (Anderson and Rice, 1992)?

Hypothesis 1a: There will be significant differences between MZ twins and DZ twins on the construct of empathy with the MZ twins reporting and demonstrating significantly higher levels of empathy than DZss twins, as measured by the *Sibling Inventory of Behavior – Expanded Version* (Anderson and Rice, 1992).

Hypothesis 1b: There will be significant differences between female MZ and DZss twins and male MZ and DZss twins on the construct of empathy with female MZ and DZss twins reporting and demonstrating higher levels of empathy than male MZ and DZ twins, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

. Hypothesis 1c: There will be significant reporter differences on the construct of empathy, specifically, there will be an interaction of reporter by twinship whereby MZ twins will perceive the level of empathy within the twin relationship more similarly than DZss twins will perceive the level of empathy within the twin relationship, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Research Question 2: Are there significant twinship status differences, gender differences, reporter differences or a reporter by twinship interaction on the construct of companionship, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 2a: There will be significant differences between MZ twins and DZss twins on the construct of companionship with MZ twins reporting and demonstrating significantly higher levels of companionship than DZss twins, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 2b: There will be significant differences between female MZ and DZss twins and male MZ and DZss twins on the construct of companionship with the female MZ and DZss twins reporting and demonstrating higher levels of companionship than male MZ and DZss twins, as measured by the *Sibling Inventory of Behavior-Expanded Version* (Anderson and Rice, 1992).

Hypothesis 2c: There will be significant reporter differences on the construct of companionship, specifically, there will be a reporter by twinship interaction whereby the MZ twins will perceive the level of companionship within the twin relationship more similarly than DZss twins will perceive the level of companionship, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Research Question 3: Are there significant twinship status differences, gender differences, reporter differences, or a reporter by twinship interaction on the construct of directiveness/teaching, as measured by the *Sibling Inventory of Behavior - Expanded Version* (Anderson and Rice, 1992).

Hypothesis 3a: There will be significant differences between MZ twins and DZss twins on the construct of directiveness/teaching with the MZ twins reporting and demonstrating significantly higher levels of directiveness/teaching than DZss twins, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 3b: There will be significant differences between female MZ and DZss twins on the construct of directiveness/teaching with female MZ and DZss twins reporting and demonstrating higher levels of directiveness/teaching than male MZ and

DZss twins, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 3c: There will be significant reporter differences on the construct of directiveness/teaching, specifically, there will be a reporter by twinship interaction whereby the MZ twins will perceive the level of directiveness/teaching within the twin relationship more similarly than DZss twins will perceive the level of directiveness/teaching, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Research Question 4: Are there significant twinship status differences, gender differences, reporter differences, or a reporter by twinship interaction on the construct of avoidance, as measured by the – *Sibling inventory of Behavior - Expanded Version* (Anderson and Rice, 1992).

Hypothesis 4a: There will be significant MZ and DZss differences on the construct of avoidance, with MZ twins reporting and demonstrating significantly lower levels of avoidance than DZss twins, as measured by the *Sibling Inventory of Behavior - Expanded Version* (Anderson and Rice, 1992).

Hypothesis 4b: There will be significant differences between female MZ and DZss twins and male MZ and DZss twins on the construct of avoidance with female MZ and DZss twins reporting and demonstrating lower levels of avoidance than male MZ and DZss twins as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 4c: There will be significant reporter differences on the construct of avoidance, specifically, there will be a reporter by twinship interaction whereby the MZ twins will perceive the level of avoidance within the twin relationship more similarly than DZss twins will perceive the level of avoidance within the twin relationship, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Research Question 5: Are there significant twinship status differences, gender differences, reporter differences, or a reporter by twinship interaction on the construct of rivalry as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 5a: There will be significant differences between MZ and DZss twins on the construct of rivalry, with MZ twins reporting and demonstrating significantly lower levels of rivalry than DZss twins, as measured by the *Sibling Inventory of Behavior – Expanded Version* (Anderson and Rice, 1992).

Hypothesis 5b: The null hypothesis is predicted. There will be no significant difference between female MZ and DZss twins and male MZ and DZss twins on the construct of rivalry, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 5c: There will be significant reporter differences on the construct of rivalry, specifically, there will be a reporter by twinship interaction whereby the MZ twins will perceive the level of rivalry within the twin relationship more similarly than

DZss twins will perceive the levels of rivalry within the twin relationship as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Research Question 6: Are there significant twinship status differences, gender differences, reporter differences, or a reporter by twinship interaction on the construct of aggression as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 6a: There will significant differences between MZ and DZss twins on the construct of aggression with MZ twins reporting and demonstrating significantly lower levels of aggression than DZss twins, as measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 6b: The null hypothesis is predicted. There will be no significant difference between female MZ and DZss twins and male MZ and DZss twins on the construct of aggression, as measured by the *Sibling Inventory of Behaviors -Expanded Version* (Anderson and Rice, 1992).

Hypothesis 6c: There will be significant reporter differences on the construct of aggression, specifically, there will be a reporter by twinship interaction whereby the MZ twins will perceive the level of aggression within the twin relationship more similarly than DZss twins will perceive the level of aggression as, measured by the *Sibling Inventory of Behavior -Expanded Version* (Anderson & Rice, 1992).

CHAPTER 3: METHOD

The data for this study are part of a national study from the Nonshared Environment in Adolescent Development (NEAD) project (Reiss, Neiderhiser, Hetherington, & Plomin, 2000), a multi-method, multi-measure longitudinal study designed to investigate the role of differential experience in adolescent development for 720 families classified by sibling genetic relatedness.

The original study began as a collaborative project merging behavioral genetics and family process perspectives in order to explore the effects of family relationships and genetic factors on adolescent development. The three primary investigators included Robert Plomin, Mavis Hetherington, and David Reiss. Robert Plomin has authored, or co-authored over 550 published works running the gambit of developing mouse models to identify genes in complex behavioral systems to twin studies of both twins reared together and twins reared apart. Mavis Hetherington, is a pioneer explorer of family dynamics (Association of Psychological Science, 2006). David Reiss is a social psychologist and researcher who has been the director of the Center for Family Research at George Washington University Medical Center. The data for the current research are from the first wave of the study.

PARTICIPANTS

The sample was compiled through a combination of random digit dialing and the use of commercial market panels resulting in a sample recruited from a wide range of geographic regions in the 48 contiguous states.

The adolescent participants include 192 same-sex twin pairs and their biological parents. The twin pairs consist of the two following groups: (1) MZ twins (n = 93) and (2) DZss twins (n = 98). There were 95 male and 96 females included in the study. Participants ranged in age from 10 to 18 years (M = 12.7, SD = 1.6). The average age for the female MZ twins was 14 years (M = 14.1; SD = 2.7). The average age for the male MZ twins was 13 years (M = 13.3; SD = 2.7). The average age for female DZ twins was 13 (M=13.1; SD =2.5). The average range of the male DZ twins was 14 years (M= 13.9; SD =2.2). See Table 1 for the demographic characteristics of the sample.

The MZ and DZss twins come from intact families where all family members reside in the same home. Many of the families had additional siblings in the family. See Table 1 for the demographic characteristics of the sample.

The families come from a wide range of education and income levels. The mean number of years of education is 13.6 for mothers and 14.0 for fathers. The mean family income for the total sample is in the $25,000-$35,000 range. Most of the sample (94% of women and 93% of men) is European American. The remaining ethnic composition is comprised of 4% African American and 1% Hispanic. Sixteen percent of the participants lived in urban areas, 26 per cent in suburban areas, 29 per cent in small towns, and 29 per cent in rural areas. Table 1 presents the demographic characteristics of the sample.

Table 1

Demographic Information of Sample

Characteristics	MZ Twins		DZ Twins	
	Female M (SD)	Male M (SD)	Female M (SD)	Male M (SD)
Age of Adolescents (in years)	14.109(2.69)	13.319(2.72)	13.080(2.47)	13.98(2.19)
Age of Mothers (in years)	39.089(9.61)	39.630(5.45)	40.939(4.98)	41.667(4.42)
Age of Fathers (in years)	43.489(6.43)	41.500(5.46)	43.306(5.73)	44.604(6.27)
Duration of Marriage (years)	19.140(4.99)	17.930(4.11)	18.532(3.87)	19.422(4.70)
Sibling other than Twins (number)	1.326(1.12)	.915(.72)	1.020(.94)	1.292(1.30)

Ethnicity of Total Sample

European American	94%
African American	4%
Hispanic	1%

INSTRUMENTS

The Diagnosis of Twin Zygosity (Nichols & Bilbro, 1966)

The Diagnosis of Twin Zygosity is the most widely used measure for research on twins in which zygosity is a factor. The questionnaire asks for information about twins' hair color, texture, and pattern of growth, height and weight, eye color, how often they have been mistaken for their twin by parents, teachers, close friends, and casual friends, and whether they know they are identical or fraternal and on what they base their knowledge.

The questionnaire was normed on a sample of 1,239 twins. The twins were sent *The Diagnosis of Twin Zygosity* (Nichols & Bilbro, 1966) questionnaire. Scoring rules for the questionnaire were developed and cross validated on part of the twin sample. Blood-group zygosity diagnosis was obtained for 124 sets of twin - 82 MZ and 42 DZ. An additional 81 sets of twins diagnosed as DZ, based on different eye color were combined with 40 of the blood diagnosed MZ twins in the development of the scoring rules. The other 42 MZ pairs and 42 DZ pairs were kept for cross-validation purposes.

In developing the rules, a three stage process was completed. In stage one, twins were diagnosed as DZ if they had differing hair color or eye color or height or reported they were never mistaken for their twin by teachers; they were reported as MZ if they reported being mistaken as their twin frequently by either their parents or close friend. 38% of the MZ and 55% of the DZ were diagnosable at stage one, 92% (36 of 39) in agreement with blood diagnosis. During stage two a point system was applied to the less clear-cut items of evidence obtained from the questionnaire. All but 7% were diagnosed during stage two. Those 6 remaining pairs were diagnosed at the third stage, on the basis

of general impression from reading the questionnaires. The second stage diagnosis was no less accurate than the first stage: 95% were in agreement with blood-type diagnosis. At the third stage, 84% were correct. The entire twin sample was then diagnosed using the rules.

Overall, a 93% accuracy of the preliminary rules in diagnosing the cross-validation cases was obtained. The intraclass correlations of the NMSQT Composite score for the various levels of diagnosis were very stable for all methods of diagnosis, a finding indicating comparable accuracy for the various methods in identifying DZ twins. These correlations are consistent with the cross-validation results in that they indicate that the two levels of diagnosis by the rules are not appreciably different in accuracy from the blood diagnosis. Overall, the 93% accuracy achieved by the objective rules is not appreciably different from the degree of accuracy obtained by all but the most extensive blood analyses. Therefore, when checked against blood tests using single gene markers, this questionnaire provides an accurate classification in more than 90 percent of cases (Nichols & Bilbo, 1966).

Sibling Inventory of Behavior-Expanded Version (Anderson & Rice, 1992)

Mothers, fathers and both children/adolescents completed an expanded version (Anderson & Rice, 1992) of the *Sibling Inventory of Behavior* (Schafer & Edgerton, 1981) adapted for NEAD. This 32-item questionnaire contains items that describe how siblings behave toward one another; respondents rate the frequency from 1 = never to 5 = always. Six subscales are used: Companionship (e.g., “has fun with sibling,” “treats sibling as a good friend”, 6 items, median alpha = .88); Empathy (e.g., “is pleased by

progress sibling makes,' "shows sympathy when things are hard for sibling," 5 items, median alpha = .88); Teaching/Directiveness (e.g., "teaches sibling new skills," "tries to teach sibling how to behave," 4 items, median alphas = .67); Rivalry (e.g., "is jealous of sibling," "tattles on siblings," 7 items, median alpha = .77); Avoidance (e.g., "is embarrassed to be with sibling in public," "acts ashamed of sibling," 5 items, median alpha = .85); and Aggression (e.g., "gets angry with sibling," "fusses and argues with sibling," 5 items, median alpha = .80) . Anderson and Rice (1992) found positive and significant correlations between observer ratings of sibling relationship quality and parent and child reports on the *Sibling Inventory of Behavior-Expanded Version (Anderson & Rice. 1992)*. Validity discriminates between divorced and nondivorced families. In addition, Anderson and Rice, (1992) show that the Sibling Inventory of Behavior predicts, 2 years later, externalizing disorders and social competence. A summary of the constructs measured by the *Sibling Inventory of Behavior- Expanded Version* (Anderson & Rice, 1992), the questions utilized and the median alphas are reported in Table 2.

Table 2

Constructs and Items on the Sibling Inventory of Behavior

Construct/Scale	Item	Median Alpha	Reporter
Empathy	Is pleased with progress (Child 2) makes. Wants (Child 2) to succeed. Shows sympathy when things are hard for (Child 2). Is concerned for (Child 2's) welfare and happiness. Tries to comfort (Child2) when (s/he) is unhappy or upset.	.88	M, F, T1, T2
Companionship	Accepts (Child 2) as a playmate. Gets ideas for things they can do together. Has fun at home with (Child 2). Treats (Child 2) as a good friend. Makes plans that include (Child 2). Shares secrets with (Child2).	.88	M, F, T1, T2
Directiveness/ Teaching	Teaches (Child 2) new skills. Helps (Child 2) adjust to new a situation. Babysits and cares for (Child 2). Tries to teach (Child 2) how to behave.	.67	M, F, T1, T2

Note. M = Mother; F = Father; T1 = Twin 1; T2 = Twin 2

Table 2 continued

Constructs and Items on the Sibling Inventory of Behavior

Construct/Scale	Item	Median Alpha	Reporter
Avoidance	Is embarrassed to be with (Child 2). Stays away from (Child 2) if possible. Acts ashamed of (Child 2). Frowns or pouts when (Child 2) has to be with (him/her). Tries to avoid being seen with (Child 2).	.85	M, F, T1, T2
Rivalry	Tattles on (Child 2). Is jealous of (Child 2). Is nosey and has to know everything about (Child 2). Takes advantage of (child 2). Blames (Child 2) when something goes wrong. Is very competitive against (Child 2). Resents (Child 2).	.77	M, F, T1, T2
Aggression	Teases or annoys (Child 2). Gets angry with (Child 2). Fusses and argues with (Child 2). Hurts (Child 2's) feelings. Has physical fights with (Child 2).	.80	M, F, T1, T2

Note. M = Mother; F = Father; T1 = Twin 1; T2 = Twin 2

PROCEDURE

The larger study included 720 families. Twins whose zygosity could not be determined by *The Diagnosis of Twin Zygosity* (Nichols & Bilbro, 1966) were not included in the current study. Twelve twin pairs, or six per cent, could not be determined; therefore were excluded. The zygosity of the twins was determined by ratings made by the research interviewers and by both parents using a standardized questionnaire about physical similarity (Nichols & Bilbo, 1966). When checked against blood tests using single gene markers, this questionnaire provides an accurate classification in more than 90 percent of cases. Each sibling had to be of the same sex. Other exclusionary factors included adolescents who were eligible or received services from special education, who were diagnosed with mental retardation, blindness, hearing impaired, or other mental or physical challenge.

Sample Collection

The larger study was designed in order to investigate family systems which included intact families, step-families, half-sib step-families, step-families with genetically unrelated siblings, intact families with non-twin siblings, and intact families with monozygotic twins and dyzygotic twins. All fifty states are represented in the sample, with the exception of Hawaii, Alaska, and South Dakota. Interviewers also resided all over the United States. Overall data collection was supervised by the National Opinion Research Center (NORC), a social survey research organization at the University of Chicago.

Interviewer Preparation

Under the supervision of NORC, 37 teams were created. Each interview team was comprised of two persons. Each team was supervised by four field managers. All teams went to Chicago for training prior to beginning their work, and returned to their home base after training. The teams' work was closely supervised through checks of the quality of the questionnaire responses. Teams were assigned families that lived in their general vicinity. Once a particular team of two had been assigned to a family, the team would travel to the families' residence and obtain questionnaire responses and video tapings, along with other data not related to the current study.

Administration of the Questionnaire

The overall data collection included many questionnaires as well as interviews and video-recordings of triadic and sibling interactions. Therefore, the data was collected in two sessions in the home, with each session lasting approximately 3 hours, with a one week interim between the two sessions.

During the first visit, each individual family member was also provided with the *Sibling Inventory of Behavior-Expanded Version* (Anderson & Rice, 1992). The individual family members were asked to respond to the questions out of hearing of other family members. All respondents rated the behavior of each child toward the other, with the individual twins reporting on their own behavior and their sibling. If necessary, parents were offered assistance by a team member. Assistance was also provided for adolescents who had difficulty reading or understanding the questionnaire.

CHAPTER 4: RESULTS

The current study examined the differences in the quality of the twin relationship between adolescent monozygotic (MZ) twins (n = 93) and same-sex dyzygotic (DZss) twins (n = 98) in the areas of empathy, companionship, directiveness/teaching, avoidance, rivalry and aggression., as measured by the *Sibling Inventory of Behavior - Expanded Version* (Anderson and Rice, 1992). The study investigated twinship status difference, gender differences, reporter differences, and interaction effects of reporter by twinship on the six constructs. For each of the six constructs, a 2 (twinship; MZ vs. DZss) X 2 (gender) {between} X 2 (target; T1, T2) X 4 (reporter; mother, father, twin 1, twin 2), with repeated measures on the last two factors, analysis of variance (ANOVA) was performed. The alpha level was set at .05 in order to control for Type I errors, and data analyses were conducted using SPSS for Windows statistical package (SPSS 12.0, 2003). If significant findings resulted, post hoc pairwise comparisons were completed. In order to adjust for inflated alpha error, the Least Significant Difference (LSD) was used. Pearson Correlations were run to investigate the mean correlation between raters and the mean correlation across constructs. These correlations are presented in the Table 3.

Table 3

Mean Correlations Across Raters and Constructs

Mean Correlations Across Raters

Construct	Target Twin 1 Mean(low/high)	 Twin 2 Mean (low/high)
Rivalry - Aggression	.62 (.50/.72)	.65 (.54/.76)
Rivalry - Avoidance	.48 (.41/.52)	.53 (.50/.55)
Rivalry - Companionship	-.31 (-.20/-.50)	-.32(-.28/-.36)
Rivalry – Empathy	-.39 (-.20/-.51)	-.35(-.26/-.48)
Rivalry – Directiveness/Teaching	-.16 (-.03/-.23)	-.05 (-.03/-.02)
Aggression – Avoidance	.38 (.37/.49)	.45(.40/.51)
Aggression – Companionship	-.34(-.24/-.39)	-.34(-.28/-.37)
Aggression – Empathy	-.41(-.30/-.50)	-.41(-.37/-.48)
Aggression– Directiveness/Teaching	-.15(-.11/-.19)	-.18(-.08/-.25)
Avoidance – Companionship	-.57(-.53/-.63)	-.56(-.54/-.60)
Avoidance – Empathy	-.45(-.41/-.47)	-.47(-.44/-.51)
Avoidance – Directiveness/Teaching	-.18(-.15/-.24)	-.21(-.16/-.28)
Companionship – Empathy	.72(.68/.77)	.72(.68/.77)
Companionship – Directiveness/Teaching	.55(.53/.58)	.55(.51/.59)
Empathy – Directiveness/Teaching	.57(.51/.61)	.58(.54/.61)

Table 3 continued.

Mean Correlations Across Constructs

Construct	Target Twin 1 Mean(low/high)	 Twin 2 Mean (low/high)
Empathy	.44(.34/.66)	.47(.34/.67)
Companionship	.50(.40/.62)	.53(.45/.73)
Directiveness/Teaching	.26(.19/.35)	.27(.10/.50)
Avoidance	.35(.19/.53)	.38(.27/.56)
Rivalry	.23(.01/.50)	.26(.11/.47)
Aggression	.37(.20/.54)	.37(.11/.50)

RESULTS FOR EMPATHY

Table 4 presents the means and standard deviations for gender and twinship status for empathy. Table 5 summarizes the ANOVA results for the analyses. Table 5 includes the tests of between-subject effects as well as the within–subject effects for empathy and the measure of explained variance (eta ^{2}). Table 6 reports the follow-up LSD pairwise comparisons for reporter. Figure 1 represents the interaction effect of reporter by target.

For empathy, as hypothesized, there was a main effect of twinship (F (1,187) = 4.311, p=.039), with empathy being greater for MZ twins (mean =18.568, sd = .313) than for DZ twins (mean= 17.660, sd = .305). As hypothesis 1b predicted, there was a significant main effect of gender (F (1,187) =28.715, p<.000), with female MZ and DZss twins demonstrating and reporting higher levels of empathy (mean = 19.286, sd = .310) than male MZ and DZss twins (mean = 16.942, sd = .309). With regards to hypothesis 1c, there was a main effect of reporter (F (3,185) =15.689, p<.000); however, follow-up LSD pairwise comparison analysis found no significant difference between twin 1 and twin 2's reports (mean diff. = 1.47, sd = .26, p = .57). There were significant differences found, however, between mothers and fathers report (mean difference = .75, st. error = .24, p =.002), mother and twin 1 reports (mean difference = 1.68, sd. err. = .32, p < .000), mother and twin 2 reports (mean difference = 1.83, sd. err. =.32,p<.000), father and twin 1 reports (mean difference = .93, sd. err. = .33, p = .005), and father and twin 2 reports (mean diff. = 1.07, sd. err. = .34, p = .002). There was no interaction effect of reporter by

twinship. While it wasn't hypothesized, a significant reporter by target interaction effect ($F (3, 185) = 41.293$, $p<.000$) was also found.

Table 4

Means and Standard Deviations for Twinship Status and Gender – Empathy

Reporter	Target	MZ or DZ	Gender	M	SD	n
Mother	T1 to T2	MZ Twin	Male	19.457	3.075	46
			Female	20.872	2.692	47
			Total	20.172	2.958	93
Mother	T1 to T2	DZ Twin	Male	17.040	3.522	50
			Female	19.708	3.476	48
			Total	18.347	3.731	98
Mother	T1 to T2	Total	Male	18.198	3.514	96
			Female	20.284	3.151	95
			Total	19.236	3.490	191
Mother	T2 to T1	MZ Twin	Male	19.087	3.626	46
			Female	20.723	3.084	47
			Total	19.914	3.444	93
Mother	T2 to T1	DZ Twin	Male	17.160	3.616	50
			Female	19.375	3.480	48
			Total	18.245	3.703	98
Mother	T2 to T1	Total	Male	18.083	3.729	96
			Female	20.042	3.342	95
			Total	19.058	3.667	191

Table 4 continued

Means and Standard Deviations of Empathy for Twinship Status and Gender – Empathy

Reporter	Target	MZ or DZ	Gender	M	SD	n
Father	T1 to T2	MZ Twin	Male	18.609	3.409	46
			Female	19.420	3.518	47
			Total	19.019	3.470	93
Father	T1 to T2	DZ Twin	Male	16.500	3.394	50
			Female	19.100	3.564	48
			Total	17.773	3.699	98
Father	T1 to T2	Total	Male	17.510	3.545	96
			Female	19.258	3.526	95
			Total	18.380	3.634	191
Father	T2 to T1	MZ Twin	Male	18.174	3.797	46
			Female	19.649	3.812	47
			Total	18.919	3.856	93
Father	T2 to T1	DZ Twin	Male	16.980	3.577	50
			Female	18.979	3.355	48
			Total	17.959	3.595	98
Father	T2 to T1	Total	Male	17.552	3.713	96
			Female	19.311	3.585	95
			Total	18.427	3.746	191

Table 4 continued

Means and Standard Deviations of Empathy for Twinship Status and Gender – Empathy

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 1	T1 to T2	MZ Twin	Male	17.478	4.466	46
			Female	19.585	5.524	47
			Total	18.543	5.112	93
Twin 1	T1 to T2	DZ Twin	Male	16.030	4.943	50
			Female	20.104	3.680	48
			Total	18.025	4.806	98
Twin 1	T1 to T2	Total	Male	16.724	4.752	96
			Female	19.847	4.666	95
			Total	18.278	4.951	191
Twin 1	T2 to T1	MZ Twin	Male	16.239	4.863	46
			Female	17.830	5.673	47
			Total	17.043	5.321	93
Twin 1	T2 to T1	DZ Twin	Male	13.960	5.005	50
			Female	18.771	3.771	48
			Total	16.316	5.039	98
Twin 1	T2 to T1	Total	Male	15.052	5.043	96
			Female	18.305	4.805	95
			Total	16.670	5.177	191

Table 4 continued

Means and Standard Deviations of Empathy for Twinship Status and Gender – Empathy

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 2	T1 to T2	MZ Twin	Male	16.054	4.206	46
			Female	18.218	5.603	47
			Total	17.148	5.053	93
Twin 2	T1 to T2	DZ Twin	Male	15.320	4.774	50
			Female	17.729	3.945	48
			Total	16.500	4.530	98
Twin 2	T1 to T2	Total	Male	15.672	4.503	96
			Female	17.971	4.817	95
			Total	16.815	4.790	191
Twin 2	T2 to T1	MZ Twin	Male	16.527	4.218	46
			Female	19.165	5.906	47
			Total	17.860	5.282	93
Twin 2	T2 to T1	DZ Twin	Male	16.460	4.563	50
			Female	19.344	4.279	48
			Total	17.872	4.636	98
Twin 2	T2 to T1	Total	Male	16.492	4.379	96
			Female	19.255	5.122	95
			Total	17.867	4.948	191

Table 5

ANOVA Results for Empathy

Tests of Between-Subjects Effects - Empathy

Source	SS	df	MS	F	p	eta^2
Twinship	314.664	1	314.664	4.311	.039*	.019
Gender	2096.081	1	2096.081	28.715	.000*	.129
Twinship X Gender	143.806	1	143.806	1.970	.162	.009
Error	13650.135	187	72.995			

* denotes significance at .05 level

Table 5 continued

Tests of Within- Subject Effects – Empathy

Source	SS	df	MS	F	p	eta2
Reporter	834.639	3	335.915	15.689	.000*	.061
Reporter X Twinship	113.574	3	45.710	2.135	.107	.008
Reporter X Gender	113.771	3	45.789	2.139	.107	.008
Reporter X Twinship X Gender	69.958	3	28.156	1.315	.270	.005
Error(reporter)	9948.293	561	21.411			
Target	11.698	1	11.698	3.063	.082	.001
Target X Twinship	4.817	1	4.817	1.261	.263	.000
Target X Gender	1.491	1	1.491	.390	.533	.000
Target X Twinship X Gender	.697	1	.697	.183	.670	.000
Error(target)	714.251	187	3.820			

* denotes significance at .05 level

Table 5 continued

Tests of Within-Subject Effects – Empathy

Source	SS	df	MS	F	Sig.	eta^2
Reporter X Target	339.618	3	120.095	41.293	.000*	.025
Reporter X Target X Twinship	9.274	3	3.280	1.128	.336	.001
Reporter X Target X Gender	4.512	3	1.595	.549	.639	.000
ReporterX Target X Twinship X Gender	20.888	3	7.386	2.540	.059	.002
Error(reporter X Target)	1538.009	561	2.908			

* denotes significance at .05 level

Table 6

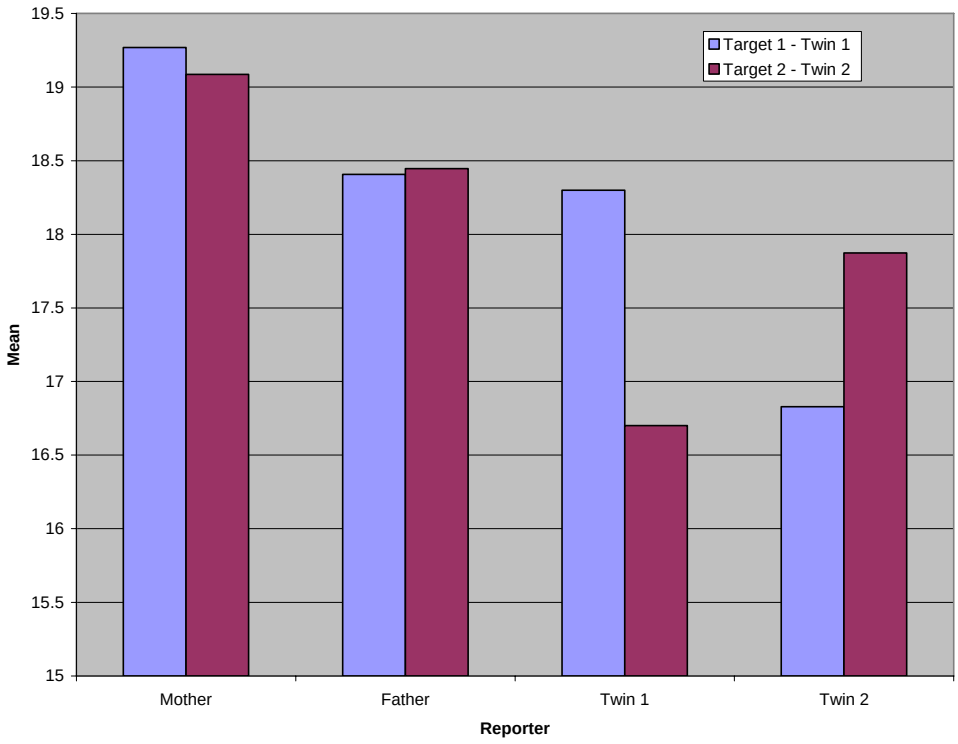
LSD Pairwise Comparison of Reporter – Empathy

Reporter	Reporter	Mean Difference (st. error)	Sig.	95% Confidence Intervals Lower	Upper
Mother	Father	.752* (.243)	.002	.27	1.23
	Twin1	1.68* (.32)	.000	1.04	2.31
	Twin 2	1.83* (.32)	.000	1.19	2.46
Father	Mother	-.75* (.24)	.002	-1.23	-.27
	Twin 1	.93* (.33)	.005	.28	1.57
	Twin 2	1.07* (.34)	.002	.40	1.75
Twin 1	Mother	-1.68* (.32)	.000	-2.31	-1.04
	Father	-.93* (.33)	.005	-1.57	-.28
	Twin 2	.147(.26)	.57	-.37	.66
Twin 2	Mother	-1.83* (.32)	.000	-2.46	-1.19
	Father	-1.07* (.34)	.002	-1.75	-.40
	Twin 1	-.147(.26)	.57	-.66	.37

* denotes significance at .05 level

Figure 1

Interaction Effect of Reporter by Target – Empathy



Hypothesis 1a predicted that MZ twins would report and demonstrate significantly higher levels of empathy than would DZss twins. As represented in Table 5, there is a statistically significant difference between twinship status on the construct of empathy, with MZ twins reporting and demonstrating higher levels of empathy than DZss twins.

Hypothesis 1b predicted that female MZ and DZss twins would report and demonstrate statistically higher levels of empathy than male MZ and DZss twins. As represented in Table 5, gender is a main effect on the construct of empathy with female MZ twin and DZss twins reporting and demonstrating higher levels of empathy than male MZ and DZss twins.

While not hypothesized, it is interesting to note that Table 5 presents data reporting that there is no interaction effect between gender and twinship, thereby suggesting that gender is a main effect regardless of twinship status.

Hypothesis 1c predicted that there would be reporter differences, specifically that the MZ twins would perceive the level of empathy more similarly than DZss twins. The initial ANOVA suggests that there is a main effect of reporter. However, a follow-up LSD pairwise comparison analysis demonstrates that the difference in reporter is not related to the twins' perception, but rather, the parental perception. As presented in Table 6, mothers viewed the level of empathy in the twin relationship differently than the fathers, twin 1 and twin 2. Fathers also viewed the levels of empathy differently than both twin 1 and twin 2. However, there was no significant difference between twin 1 and twin 2, regardless of the twinship status. There was no interaction effect of twinship by reporter.

Table 5 indicates a reporter by target interaction effect was significant. As represented in Figure 1, the interaction suggests that when reporting on themselves, twins report higher levels of empathy as compared to the level of empathy they report for their co-twin. There was no significant interaction when the mother or father reported on each twin.

RESULTS FOR COMPANIONSHIP

Table 7 presents the means and standard deviations for gender and twinship status for companionship. Table 8 summarizes the ANOVA results for the analyses. Table 8 includes the Tests of between-subject effects as well as the within–subject effects for companionship and the measure of explained variance (eta^2). Table 9 includes the LSD pairwise comparisons for reporter. Figure 2 represents the interaction effect of reporter by target. Figure 3 represents the interaction effect of reporter by gender.

For companionship, as hypothesized, there was a significant main effect of twinship (F (1,185) =12.487, p=.001), with MZ twins (mean = 23.108, sd = .350) demonstrating and reporting greater levels of companionship than DZ twins (mean = 21.380, sd = .341). As hypothesis 2b predicted, there was a main effect of gender (F (1,185) =12.738, p<.000), with female MZ and DZss twins (mean = 23.117, sd= .345) reporting and demonstrating higher levels of companionship than male MZ and DZss twins (mean = 21.371, sd = .347). With regards to hypothesis 2c, there was a significant main effect of reporter (F (3,183) =22.134, p<.000); however, follow-up LSD pairwise comparison analyses found no significant difference twin 1 and twin 2's reports (mean = .15, sd = .26, p = .57). LSD pairwise comparisons found no significant difference between mothers' and fathers' reports (mean = .38, sd. = .24, p = .11). There was a significant difference, however, between mother and twin 1 (mean difference = 2.01, sd. err. = .33, p < .000), mother and twin 2 (mean difference = 1.86, sd. err. = .32,p<.000), father and twin 1 (mean difference = .1.63, sd. Err. = .34, p < .000), and father and twin 2 (mean diff. = 1.48, sd. Err. = .33, p < .000). There was no interaction effect of reporter by

twinship. Lastly, a significant interaction effect of reporter by target occurred ($F(3, 183) = 4.099$, $p = .010$). No other effects for the mean or interactions were significant.

Table 7

Means and Standard Deviations for Twinship Status and Gender-Companionship

Reporter	Target	MZ or DZ	Gender	M	SD	n
Mother	T1 to T2	MZ Twin	Male	24.378	3.135	45
			Female	25.064	2.793	47
			Total	24.728	2.969	92
Mother	T1 to T2	DZ Twin	Male	21.371	4.059	49
			Female	22.975	3.317	48
			Total	22.165	3.778	97
Mother	T1 to T2	Total	Male	22.811	3.929	94
			Female	24.008	3.228	95
			Total	23.413	3.634	189
Mother	T2 to T1	MZ Twin	Male	23.711	3.094	45
			Female	24.532	3.209	47
			Total	24.130	3.163	92
Mother	T2 to T1	DZ Twin	Male	21.482	3.916	49
			Female	22.921	3.639	48
			Total	22.194	3.831	97
Mother	T2 to T1	Total	Male	22.549	3.701	94
			Female	23.718	3.510	95
			Total	23.137	3.644	189

Table 7 continued

Means and Standard Deviations for Twinship Status and Gender-Companionship

Reporter	Target	MZ or DZ	Gender	M	SD	n
Father	T1 to T2	MZ Twin	Male	24.067	3.564	45
			Female	24.309	4.071	47
			Total	24.196	3.812	92
Father	T1 to T2	DZ Twin	Male	20.980	3.976	49
			Female	22.867	3.537	48
			Total	21.913	3.864	97
Father	T1 to T2	Total	Male	22.457	4.071	94
			Female	23.585	3.860	95
			Total	23.024	3.996	189
Father	T2 to T1	MZ Twin	Male	23.644	3.588	45
			Female	23.770	4.203	47
			Total	23.709	3.893	92
Father	T2 to T1	DZ Twin	Male	21.041	3.813	49
			Female	22.729	3.836	48
			Total	21.876	3.898	97
Father	T2 to T1	Total	Male	22.287	3.912	94
			Female	23.244	4.034	95
			Total	22.768	3.992	189

Table 7 continued

Means and Standard Deviations for Twinship Status and Gender-Companionship

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 1	T1 to T2	MZ Twin	Male	21.129	4.714	45
			Female	22.702	5.501	47
			Total	21.933	5.164	92
Twin 1	T1 to T2	DZ Twin	Male	18.771	5.599	49
			Female	22.979	4.349	48
			Total	20.854	5.423	97
Twin 1	T1 to T2	Total	Male	19.900	5.301	94
			Female	22.842	4.928	95
			Total	21.379	5.312	189
Twin 1	T2 to T1	MZ Twin	Male	21.658	4.646	45
			Female	22.285	5.612	47
			Total	21.978	5.144	92
Twin 1	T2 to T1	DZ Twin	Male	18.318	5.152	49
			Female	22.533	3.777	48
			Total	20.404	4.974	97
Twin 1	T2 to T1	Total	Male	19.917	5.170	94
			Female	22.411	4.750	95
			Total	21.170	5.105	189

Table 7 continued

Means and Standard Deviations for Twinship Status and Gender-Companionship

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 2	T1 to T2	MZ Twin	Male	21.262	4.597	45
			Female	22.702	5.864	47
			Total	21.998	5.303	92
Twin 2	T1 to T2	DZ Twin	Male	19.041	5.331	49
			Female	22.017	4.259	48
			Total	20.513	5.032	97
Twin 2	T1 to T2	Total	Male	20.104	5.090	94
			Female	22.356	5.101	95
			Total	21.236	5.206	189
Twin 2	T2 to T1	MZ Twin	Male	21.404	4.623	45
			Female	23.098	5.600	47
			Total	22.270	5.188	92
Twin 2	T2 to T1	DZ Twin	Male	19.682	5.008	49
			Female	22.371	4.781	48
			Total	21.012	5.056	97
Twin 2	T2 to T1	Total	Male	20.506	4.879	94
			Female	22.731	5.188	95
			Total	21.624	5.145	189

Table 8

ANOVA Results for Companionship

Tests of Between-Subjects Effects for Companionship

Source	SS	DF	MS	F	p	eta^2
Twinship	1127.604	1	1127.604	12.487	.001*	.058
Gender	1150.284	1	1150.284	12.738	.000*	.060
Twinship X Gender	268.316	1	268.316	2.971	.086	.014
Error	16706.378	185	90.305			

* denotes significance at .05 level

Table 8 continued

Tests of Within-Subject Effects – Companionship

Source	SS	df	MS	F	Sig.	eta^2
Reporter	1179.119	3	482.686	22.134	.000*	.090
Reporter X Twinship	65.860	3	26.961	1.236	.295	.005
Reporter X Gender	186.719	3	76.436	3.505	.092	.014
Reporter X Twinship X Gender	72.168	3	29.543	1.355	.259	.005
Error (reporter)	9855.458	555	21.808			
Target	3.076	1	3.076	1.317	.253	.000
Target X Twinship	3.756	1	3.756	1.608	.206	.000
Target X Gender	2.597	1	2.597	1.112	.293	.000
Target X Twinship X Gender	.003	1	.003	.001	.974	.000
Error (target)	432.175	185	2.336			

* denotes significance at .05 level

Table 8 continued

Tests of Within-Subject Effects – Companionship

Source	SS	df	MS	F	Sig.	eta^2
Reporter X Target	28.620	3	11.044	4.099	.010*	.002
Reporter X Target X Twinship	17.517	3	6.759	2.509	.067	.001
Reporter X Target X Gender	3.239	3	1.250	.464	.679	.000
Reporter X Target X Twinship X Gender	7.638	3	2.947	1.094	.346	.006
Error (reporter X target	1291.643	555	2.694			

* denotes significance at .05 level

Table 9

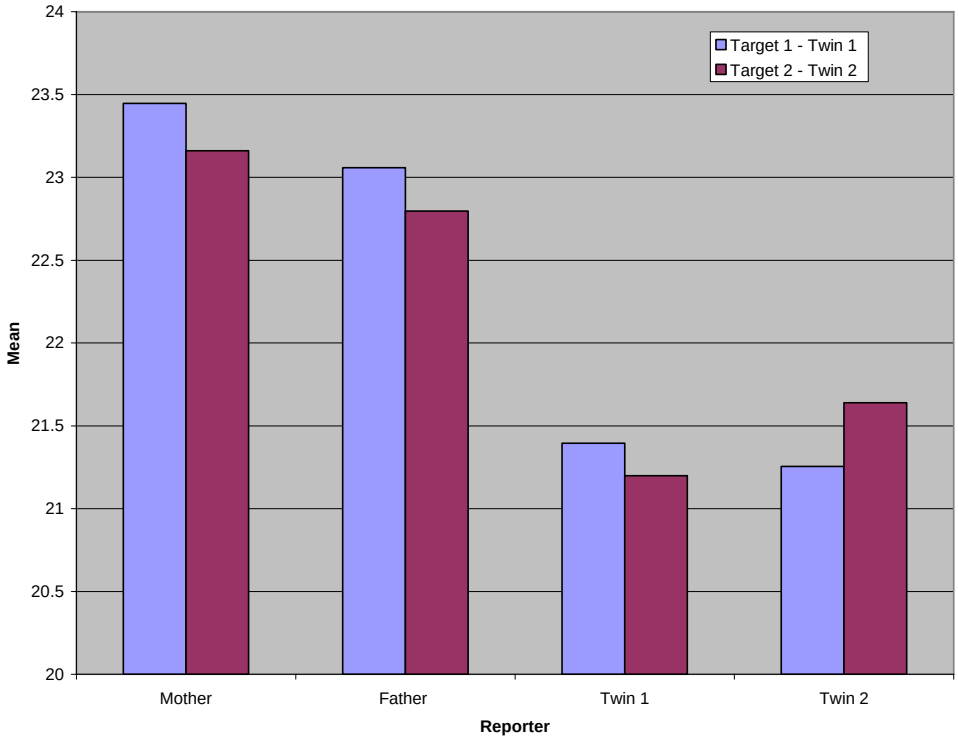
LSD Pairwise Comparison of Reporter – Companionship

Reporter	Reporter	Mean Difference (st. error)	Sig.	95% Confidence Intervals Lower	Upper
Mother	Father	.38 (.24)	.11	-.09	.85
	Twin1	2.01* (.33)	.000	1.36	2.65
	Twin 2	1.86* (.32)	.000	1.22	2.49
Father	Mother	-.38 (.24)	.11	-.85	.09
	Twin 1	1.63* (.34)	.000	.96	2.30
	Twin 2	1.48* (.33)	.000	.82	2.14
Twin 1	Mother	-2.01* (.33)	.000	-2.65	-1.36
	Father	-1.63* (34)	.000	-2.30	-.96
	Twin 2	-.15 (.26)	.57	-.67	.37
Twin 2	Mother	-1.86* (.32)	.000	-2.49	-1.22
	Father	-1.48* (.33)	.000	-2.14	-.82
	Twin 1	.15 (.26)	.57	-.37	.67

* denotes significance at the .05 level

Figure 2

Interaction Effect of Reporter by Target – Companionship



Hypothesis 2a predicted that there would be overall differences between MZ and DZss twins on the construct of companionship. As Table 8 shows, there was a statistically significant difference between twinship status on the construct of companionship. It was further hypothesized that MZ twins would demonstrate and report greater levels of companionship than DZss twins, which was also supported. Hypothesis 2a is confirmed.

Hypothesis 2b predicted that gender would be a main effect on the construct of companionship, with female MZ and DZss twins reporting and demonstrating statistically higher levels of companionship than male MZ and DZss twins. As Table 8 shows, gender is a main effect on the construct of companionship. Female MZ and DZss twins report and demonstrate higher levels of companionship than male MZ and DZss twins, as was predicted. Hypothesis 2b is confirmed. While not hypothesized, it is interesting to note that the Table 8 presents data reporting that there is no interaction effect between gender and twinship, thereby suggesting that gender is a main effect regardless of twinship status.

Hypothesis 2c predicted that there would be reporter differences, specifically, the individual MZ twins within the twinship would perceive the level of companionship more similarly than would the individual twins within the DZss twinship. The results reported in Table 8 reveals that there is a main effect of reporter; however, the follow-up LSD pairwise comparison analyses demonstrates that the difference in reporter is not related to the twins' difference in perception, but rather, the parental perception. As presented in Table 9, mothers and fathers viewed the level of companionship similarly to each other. The analysis also demonstrates that while mothers and fathers report the level of

companionship similarly to each other, they perceive the relationship statistically different than both twins. There was no reporter by twinship interaction effect.

While it wasn't hypothesized that an interaction would occur between the reporter and target, Table 8 presents the finding that there is an interaction effect of reporter by target. As represented in Figure 2, when twins report on themselves, they report higher levels of companionship for themselves as compared to their report on their co-twin. There was no significant interaction effect when the mother or father reported on each twin.

RESULTS FOR DIRECTIVENESS/TEACHING

Table 10 reports the means and standard deviations for directiveness/teaching. Table 11 summarizes the ANOVA results for the analyses. Table 11 includes the tests of between -subject effects, as well as the within–subject effects for directiveness/teaching and the measure of explained variance (eta^2). Table 12 includes the follow-up LSD pairwise comparisons of reporter for directiveness/teaching.

For directiveness/teaching, although a twinship status difference was predicted, a significant main effect of twinship was not found (F (1,183) = 3.790; p = .053). However, hypothesis 3b was confirmed, in that a significant main effect of gender (F(1,183)=7.653, p=.006) was found, with female MZ and DZss twins (mean = 10.575, sd = .192) demonstrating and reporting higher levels of directiveness/teaching than male MZ and DZss twins (mean= 9.831, sd =.189). With regards to hypothesis 3c, there was a significant main effect of reporter (F(3,181)=13.815, p<.000). However, follow-up LSD pairwise comparison found no significant difference between twin 1 and twin 2's reports (mean = .37, sd = .21, p = .09). There was also no difference between mothers and father's reports (mean = .03, sd = .23, p = .90). There were significant differences between mother and twin 1 (mean difference = .85, sd. err. = .24, p = .001), mother and twin 2 (mean difference = 1.22, sd. err. =..24,p<.000), father and twin 1 (mean difference = .88, sd. Err. = .25, p = .001), and father and twin 2 (mean diff. = 1.24, sd. Err. = .26, p < .000). There was also a significant reporter by twinship interaction effect (F(3,181) = 3.770, p = .012), reporter by twinship by gender interaction effect (F (3, 181) = 3.693, p = .014), and a significant reporter by target interaction effect (F(3, 181)=12.318, p<.000).

Table 10

Means and Standard Deviations for Twinship Status and Gender-Directiveness/Teaching

Reporter	Target	MZ or DZ	Gender	M	SD	n
Mother	T1 to T2	MZ Twin	Male	10.919	2.602	45
			Female	11.152	2.640	44
			Total	11.034	2.609	89
Mother	T1 to T2	DZ Twin	Male	10.067	2.208	50
			Female	10.236	2.858	48
			Total	10.150	2.535	98
Mother	T1 to T2	Total	Male	10.470	2.428	95
			Female	10.674	2.779	92
			Total	10.570	2.602	187
Mother	T2 to T1	MZ Twin	Male	11.104	2.964	45
			Female	11.326	2.807	44
			Total	11.214	2.873	89
Mother	T2 to T1	DZ Twin	Male	10.200	2.239	50
			Female	10.708	2.713	48
			Total	10.449	2.483	98
Mother	T2 to T1	Total	Male	10.628	2.633	95
			Female	11.004	2.760	92
			Total	10.813	2.696	187

Table 10 continued

Means and Standard Deviations for Twinship Status and Gender-Directiveness/Teaching

Reporter	Target	MZ or DZ	Gender	M	SD	n
Father	T1 to T2	MZ Twin	Male	10.785	2.810	45
			Female	11.970	3.234	44
			Total	11.371	3.068	89
Father	T1 to T2	DZ Twin	Male	9.700	2.485	50
			Female	10.431	2.590	48
			Total	10.058	2.550	98
Father	T1 to T2	Total	Male	10.214	2.685	95
			Female	11.167	3.001	92
			Total	10.683	2.877	187
Father	T2 to T1	MZ Twin	Male	10.815	3.045	45
			Female	11.947	2.735	44
			Total	11.375	2.935	89
Father	T2 to T1	DZ Twin	Male	10.033	2.488	50
			Female	10.243	3.025	48
			Total	10.136	2.752	98
Father	T2 to T1	Total	Male	10.404	2.779	95
			Female	11.058	2.998	92
			Total	10.726	2.900	187

Table 10 continued

Means and Standard Deviations for Twinship Status and Gender-Directiveness/Teaching

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 1	T1 to T2	MZ Twin	Male	10.252	3.434	45
			Female	10.432	3.669	44
			Total	10.341	3.533	89
Twin 1	T1 to T2	DZ Twin	Male	8.980	3.210	50
			Female	11.208	2.858	48
			Total	10.071	3.228	98
Twin 1	T1 to T2	Total	Male	9.583	3.362	95
			Female	10.837	3.276	92
			Total	10.200	3.370	187
Twin 1	T2 to T1	MZ Twin	Male	9.385	3.452	45
			Female	9.727	3.500	44
			Total	9.554	3.460	89
Twin 1	T2 to T1	DZ Twin	Male	8.060	2.881	50
			Female	10.840	2.973	48
			Total	9.422	3.230	98
Twin 1	T2 to T1	Total	Male	8.688	3.217	95
			Female	10.308	3.266	92
			Total	9.485	3.333	187

Table 10 continued

Means and Standard Deviations for Twinship Status and Gender-Directiveness/Teaching

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 2	T1 to T1	MZ Twin	Male	9.259	2.587	45
			Female	8.970	2.539	44
			Total	9.116	2.553	89
Twin 2	T1 to T2	DZ Twin	Male	8.787	3.135	50
			Female	9.972	3.190	48
			Total	9.367	3.202	98
Twin 2	T1 to T2	Total	Male	9.011	2.883	95
			Female	9.492	2.925	92
			Total	9.248	2.906	187
Twin 2	T2 to T1	MZ Twin	Male	9.696	2.614	45
			Female	9.697	2.982	44
			Total	9.697	2.786	89
Twin 2	T2 to T1	DZ Twin	Male	9.247	3.276	50
			Female	10.340	3.073	48
			Total	9.782	3.209	98
Twin 2	T2 to T1	Total	Male	9.460	2.974	95
			Female	10.033	3.031	92
			Total	9.742	3.007	187

Table 11

ANOVA Results for Directiveness/Teaching

Tests of Between-Subjects Effects for Directiveness/Teaching

Source	SS	df	MS	F	p	eta^2
Twinship	102.378	1	102.378	3.790	.053	.019
Gender	206.721	1	206.721	7.653	.006*	.039
Twinship X Gender	50.740	1	50.740	1.878	.172	.010
Error	4943.300	183	27.013			

* denotes significance at .05 level

Table 11 continued

Tests of Within-Subject Effects - Directiveness/Teaching

Source	SS	df	MS	F	Sig.	eta^2
Reporter	435.287	3	154.176	13.815	.000*	.052
Reporter X Twinship	118.802	3	42.079	3.770	.012*	.014
Reporter X Gender	63.965	3	22.656	2.030	.113	.008
Reporter X Twinship X Gender	116.357	3	41.213	3.693	.014*	.014
Error(reporter)	5766.205	549	11.160			
Target	.092	1	.092	.027	.869	.000
Target X Twinship	.161	1	.161	.048	.828	.000
Target X Gender	.648	1	.648	.192	.662	.000
Target X Twinship X Gender	.018	1	.018	.005	.942	.000
Error(target)	617.087	183	3.372			

* denotes significance at .05 level

Table 11 continued

Tests of Within-Subject Effects - Directiveness/Teaching

Source	SS	df	MS	F	Sig.	eta^2
Reporter X Target	76.261	3	28.825	12.318	.000*	.009
Reporter X Target X Twinship	1.431	3	.541	.231	.851	.000
Reporter X Target X Gender	5.095	3	1.926	.823	.469	.001
Reporter X Target X Twinship X Gender	3.712	3	1.403	.600	.595	.000
Error(reporter X Target)	1132.985	549	2.340			

* denotes significance at .05 level

Table 12

LSD Pairwise Comparison for Reporter –Directiveness/Teaching

Reporter	Reporter	Mean Difference (st. error)	Sig.	95% Confidence Intervals Lower	Upper
Mother	Father	-.03 (.23)	.904	-.47	.47
	Twin1	.85* (.24)	.001	.37	1.33
	Twin 2	1.22* (.24)	.000	.75	1.69
Father	Mother	.03(.23)	.904	-.41	.46
	Twin 1	.88* (.25)	.001	.39	1.37
	Twin 2	1.24* (.26)	.000	.74	1.75
Twin 1	Mother	-.85* (.24)	.001	-1.33	-.37
	Father	-.88*(.25)	.001	-1.37	-.39
	Twin 2	.37 (.21)	.089	-.06	.79
Twin 2	Mother	-1.22* (.24)	.000	-1.69	-.75
	Father	-1.24* (.26)	.000	-1.75	-.74
	Twin 1	-.37 (.21)	.089	-.79	.06

* denotes significant at .05 level

Figure 3

Interaction Effect of Reporter by Twinship – Directiveness/Teaching

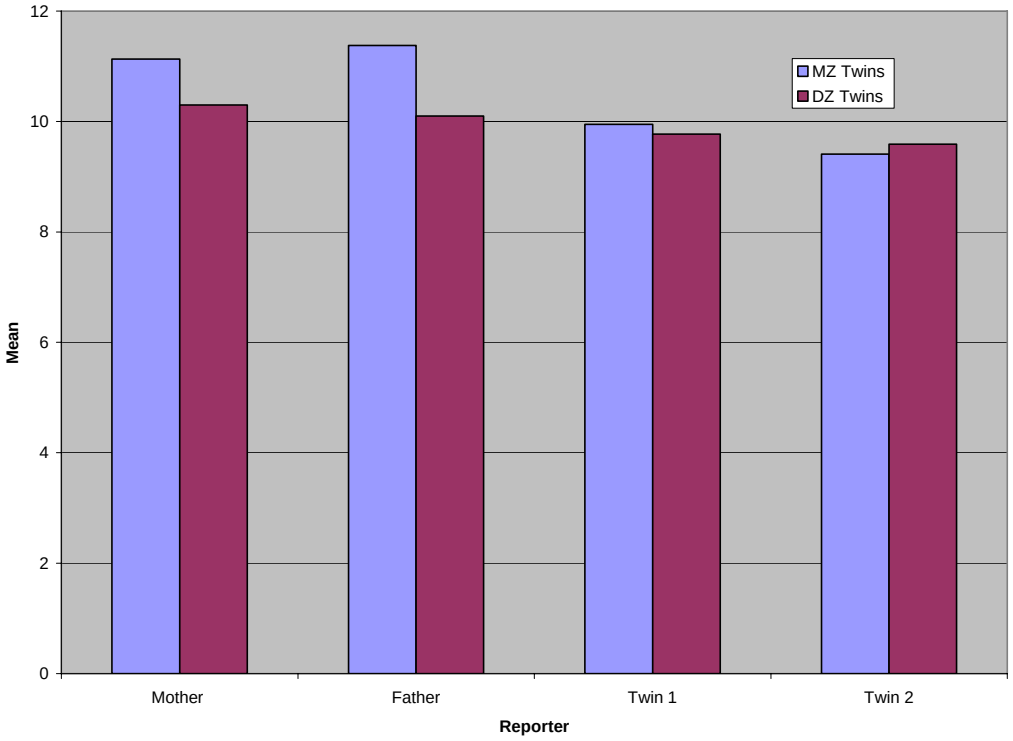


Figure 4

Interaction Effect of Reporter by Twinship by Gender – Directiveness/Teaching

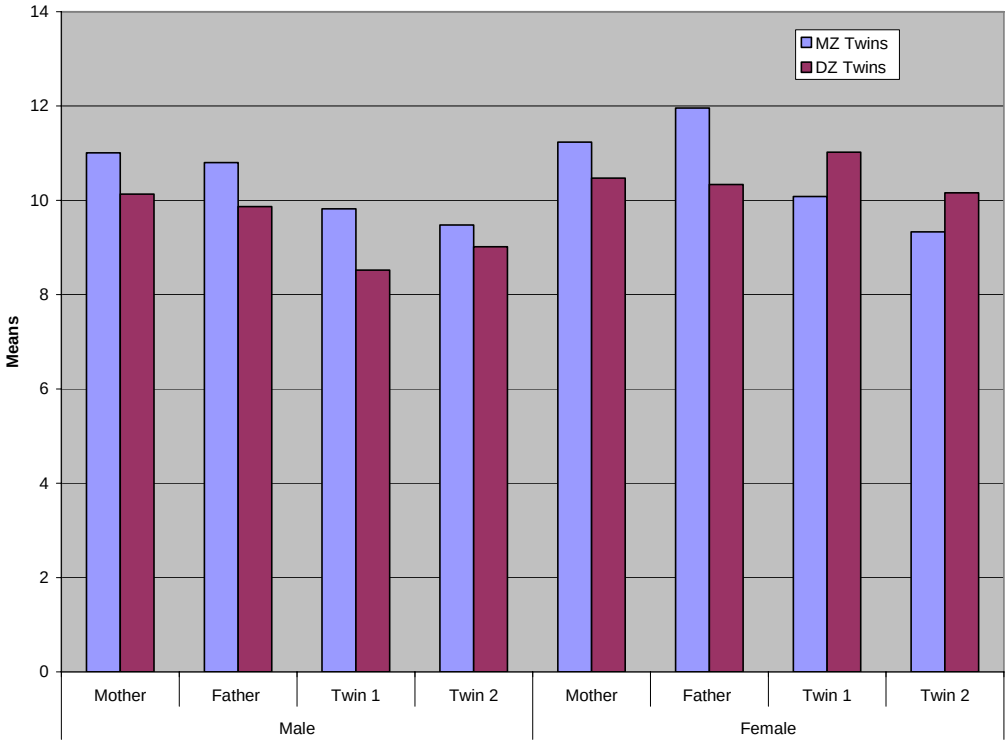
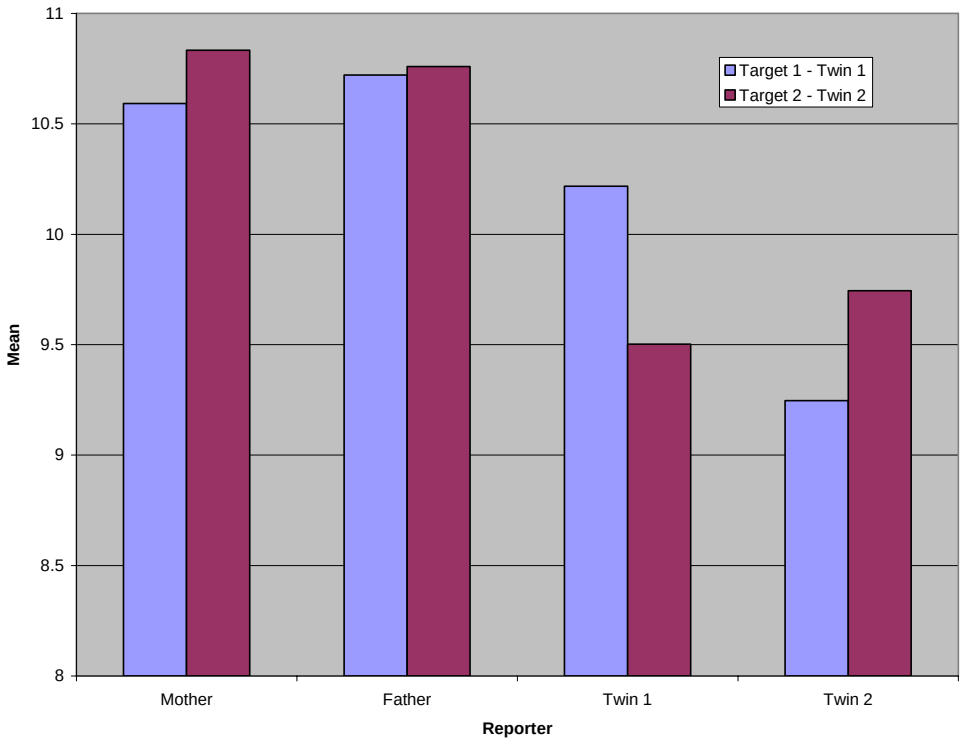


Figure 5

Interaction Effect of Reporter by Target – Directiveness/Teaching



Hypothesis 3a predicted there would be statistically significant differences between MZ and DZss twins on the construct of directiveness/teaching. As presented in Table 11, there was no statistically significant difference in twinship status on the construct of directiveness/teaching. Therefore, Hypothesis 3a is rejected.

Hypothesis 3b predicted that gender would be a main effect on the construct of directiveness/teaching, with female MZ and DZss twins reporting and demonstrating statistically higher levels of directiveness/teaching than male MZ and DZss twins. As Table 11 presents, gender was a main effect for the construct of directiveness/teaching. Female MZ and DZss twins report and demonstrate higher levels of directiveness/teaching than do male MZ and DZss twins, as was predicted. While not hypothesized, it is interesting to note that the Table 11 presents data reporting that there is no interaction effect between gender and twinship, thereby suggesting that gender is a main effect regardless of twinship status on the construct of directiveness/teaching.

Hypothesis 3c predicted that MZ twins would perceive the level of directiveness/teaching more similarly than would DZss twins. While Table 12 presents a main effect of reporter, the follow up LSD pairwise comparison analysis demonstrates that the difference in reporter is not between twins, but rather, related to the parental perceptions. As presented in Table 12, mothers and fathers viewed the level of directiveness/teaching similarly to each other. The analysis also demonstrates that while mothers and fathers report the level of directiveness/teaching similarly to each other, they perceive the relationship statistically different than both twins.

Table 11 presents the findings that there are interaction effects of reporter by twinship, reporter by target, and reporter by twinship by gender. Figures 3, 4, and 5

represent these interaction effects. The interaction effect of reporter by target suggests that the reporting twin reports higher levels of directiveness/teaching for him/herself, than when reporting on his/her co-twin. The interaction effect of reporter by twinship by gender and the interaction effect of reporter by twinship are found only on the construct of directiveness/teaching.

RESULTS FOR AVOIDANCE

Table 13 reports the means and standard deviations for avoidance. Table 14 summarizes the ANOVA results for the analyses. Table 14 includes the tests of between - subject effects as well as the within–subject effects for avoidance and the measure of explained variance (eta^2). Table 15 includes the follow-up LSD pairwise comparisons of reporter for avoidance.

For avoidance, as hypothesized, there was a significant main effect of twinship (F (1,186) =8.047, p=.005), with DZ twins (mean = 8.766, sd = .219) demonstrating and reporting greater levels of avoidance than MZ twins (mean = 7.873, sd = .226). As hypothesized 4b predicted, there was a significant main effect of gender (F (1,186) =4.460, p=.036), with male MZ and DZss twins demonstrating and reporting greater levels of avoidance (mean = 8.652, sd = .223) than female MZ and DZss twins (mean = 7.987, sd = .222). With regards to hypothesis 4c, there was a significant main effect of reporter (F (3,184) = 4.117, p=.009). Follow up LSD pairwise comparisons found no significant differences between twin 1 and twin 2 (mean = .11, sd. = .21, p = .60), mothers and fathers (mean = .26, sd. = .20, p = .21), fathers and twin 1 (mean = .36, sd = .26, p = .17), or fathers and twin 2 (mean = .47, sd.24, p = .05). However, there was a significant difference between mothers and twin 1 (mean difference = .62, sd. err. = .25, p = .01), and mothers and twin 2 (mean difference = .73, sd.err. = .24, p= .003). No other effects for the mean or interactions were significant.

Table 13

Means and Standard Deviations for Twinship Status and Gender – Avoidance

Reporter	Target	MZ or DZ	Gender	M	SD	n
Mother	T1 to T2	MZ Twin	Male	7.200	2.190	45
			Female	7.489	2.422	47
			Total	7.348	2.304	92
Mother	T1 to T2	DZ Twin	Male	8.700	2.597	50
			Female	8.500	2.806	48
			Total	8.602	2.689	98
Mother	T1 to T2	Total	Male	7.990	2.516	95
			Female	8.000	2.658	95
			Total	7.995	2.581	190
Mother	T2 to T1	MZ Twin	Male	7.511	2.702	45
			Female	7.356	2.859	47
			Total	7.432	2.769	92
Mother	T2 to T1	DZ Twin	Male	8.660	3.028	50
			Female	7.917	2.656	48
			Total	8.296	2.862	98
Mother	T2 to T1	Total	Male	8.116	2.924	95
			Female	7.640	2.758	95
			Total	7.878	2.843	190

Table 13 continued

Means and Standard Deviations for Twinship Status and Gender – Avoidance

Reporter	Target	MZ or DZ	Gender	M	SD	n
Father	T1 to T2	MZ Twin	Male	7.422	1.925	45
			Female	7.894	2.815	47
			Total	7.663	2.419	92
Father	T1 to T2	DZ Twin	Male	8.920	3.002	50
			Female	8.229	2.619	48
			Total	8.582	2.828	98
Father	T1 to T2	Total	Male	8.211	2.645	95
			Female	8.063	2.709	95
			Total	8.137	2.671	190
Father	T2 to T1	MZ Twin	Male	7.694	2.453	45
			Female	7.894	3.136	47
			Total	7.796	2.809	92
Father	T2 to T1	DZ Twin	Male	9.040	3.017	50
			Female	8.323	3.033	48
			Total	8.689	3.030	98
Father	T2 to T1	Total	Male	8.403	2.832	95
			Female	8.111	3.075	95
			Total	8.257	2.952	190

Table 13 continued

Means and Standard Deviations for Twinship Status and Gender – Avoidance

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 1	T1 to T2	MZ Twin	Male	8.594	3.250	45
			Female	7.489	3.753	47
			Total	8.030	3.540	92
Twin 1	T1 to T2	DZ Twin	Male	9.700	4.244	50
			Female	8.104	3.171	48
			Total	8.918	3.823	98
Twin 1	T1 to T2	Total	Male	9.176	3.826	95
			Female	7.800	3.466	95
			Total	8.488	3.706	190
Twin 1	T2 to T1	MZ Twin	Male	8.333	3.198	45
			Female	7.830	3.697	47
			Total	8.076	3.452	92
Twin 1	T2 to T1	DZ Twin	Male	9.700	4.010	50
			Female	8.542	3.649	48
			Total	9.138	3.863	98
Twin 1	T2 to T1	Total	Male	9.058	3.694	95
			Female	8.190	3.671	95
			Total	8.624	3.699	190

Table 13 continued

Means and Standard Deviations for Twinship Status and Gender – Avoidance

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 2	T1 to T2	MZ Twin	Male	8.878	2.894	45
			Female	7.947	3.921	47
			Total	8.402	3.470	92
Twin 2	T1 to T2	DZ Twin	Male	9.720	4.233	50
			Female	8.708	3.128	48
			Total	9.225	3.749	98
Twin 2	T1 to T2	Total	Male	9.321	3.666	95
			Female	8.332	3.544	95
			Total	8.826	3.630	190
Twin 2	T2 to T1	MZ Twin	Male	8.989	3.068	45
			Female	7.447	3.598	47
			Total	8.201	3.420	92
Twin 2	T2 to T1	DZ Twin	Male	9.360	3.498	50
			Female	8.125	3.038	48
			Total	8.755	3.322	98
Twin 2	T2 to T1	Total	Male	9.184	3.289	95
			Female	7.790	3.327	95
			Total	8.487	3.373	190

Table 14

ANOVA Results for Avoidance

Tests of Between-Subjects Effects for Avoidance

Source	SS	df	MS	F	p	eta^2
Twinship	302.676	1	302.676	8.047	.005*	.040
Gender	167.758	1	167.758	4.460	.036*	.022
Twinship X Gender	24.742	1	24.742	.658	.418	.003
Error	6996.480	186	37.615			

* denotes significance at .05 level

Table 14 continued

Tests of Within-Subject Effects – Avoidance

Source	SS	df	MS	F	Sig.	eta^2
Reporter	127.988	3	47.128	4.117	.009*	.016
Reporter X Twinship	7.835	3	2.885	.252	.841	.001
Reporter X Gender	84.784	3	31.219	1.923	.127	.010
Reporter X Twinship X Gender	15.982	3	5.885	.514	.654	.002
Error (reporter)	5782.141	558	11.447			
Target	.867	1	.867	.269	.604	.000
Target X Twinship	1.622	1	1.622	.504	.479	.000
Target X Gender	1.765	1	1.765	.549	.460	.000
Target X Twinship X Gender	.193	1	.193	.060	.807	.000
Error(target)	598.352	186	3.217			

* denotes significance at .05 level

Table 14 continued

Tests of Within-Subject Effects – Avoidance

Source	SS	df	MS	F	Sig.	eta^2
Reporter X Target	13.877	3	5.211	1.627	.188	.002
Reporter X Target X Twinship	4.833	3	1.815	.567	.617	.001
Reporter X Target X Gender	14.950	3	5.614	1.753	.162	.002
Reporter X Target X Twinship X Gender	1.296	3	.487	.152	.911	.000
Error(reporter X target)	1586.728	558	3.203			

* denotes significance at .05 level

Table 15

LSD Pairwise Comparison for Reporter - Avoidance

Reporter	Reporter	Mean Diff. (st. error)	Sig.	95% Confidence Intervals Lower	Upper
Mother	Father	-.26 (.20)	.21	-.66	.14
	Twin1	-.62*(.25)	.01	-1.11	-.13
	Twin 2	-.73* (.24)	.003	-1.20	-.26
Father	Mother	.26(.20)	.21	-.14	.66
	Twin 1	-.36(.26)	.17	-.87	.15
	Twin 2	-.47(.24)	.05	-.94	.001
Twin 1	Mother	.62*(.45)	.01	.13	1.11
	Father	.36(.26)	.16	-.15	.87
	Twin 2	-.11(.21)	.60	-.52	.30
Twin 2	Mother	.73*(.24)	.003	.26	1.20
	Father	.47(.24)	.05	-.001	.94
	Twin 1	.11 (.21)	.60	-.30	.52

* denotes significance at .05 level

Hypothesis 4a predicted that there would be overall differences between MZ and DZ twins on the construct of avoidance. As Table 14 shows, there was a statistically significant difference in twinship status on the construct of avoidance. It was further hypothesized that MZ twins would demonstrate and report lower levels of avoidance than DZss twins. The results confirm that MZ twins demonstrated and reported statistically significant lower levels of avoidance than DZss twins. Hypothesis 4a is confirmed.

Hypothesis 4b predicted that gender would be a main effect on the construct of avoidance. It was further hypothesized that female MZ and DZss twins would report and demonstrate statistically lower levels of avoidance than male MZ and DZss twins. As Table 14 presents, gender was a main effect for the construct of avoidance. Female MZ and DZss twins reported and demonstrated lower levels of avoidance than did male MZ and DZss twins, as was predicted. Therefore, Hypothesis 4b was confirmed. While not hypothesized, it is interesting to note that Table 14 presents data reporting that there is no interaction effect between gender and twinship, thereby suggesting that gender is a main effect regardless of twinship status on the construct of avoidance.

Hypothesis 4c predicted that there would be reporter differences for avoidance, specifically, MZ twins would perceive the level of avoidance more similarly than would DZss twins. Table 14 reveals that there is a main effect of reporter. However, as reported in Table 15, the follow-up LSD pairwise comparison analysis demonstrates that the difference in reporter is not related to the twins' perception, but rather, the parental perception. The analysis reveals that while mothers and fathers report the level of directiveness/teaching similarly to each other, fathers also perceived the level of avoidance similarly to each of the twins. Therefore, mothers were the only reporters who

viewed the level of avoidance statistically different than other reporters. There was no reporter by twinship interaction effect. There were no other interaction or main effects.

RESULTS FOR RIVALRY

Table 16 reports the means and standard deviations for rivalry. Table 17 summarizes the ANOVA results for the analyses. Table 17 includes the tests of between-subject effects as well as the within–subject effects for rivalry and the measure of explained variance (eta^2). Table 18 includes the follow up LSD pairwise comparisons of reporter for rivalry. Figure 6 represents the reporter by target interaction effect.

For rivalry, as hypothesized, there was a significant main effect of twinship ($F(1,180) = 4.554$, $p=.034$), with rivalry being greater for DZ twins (mean = 16.631, sd = .297) than for MZ twins (mean = 15.715, sd = .310). As predicted, the null hypothesis was confirmed, there was no main effect of gender. With regards to hypothesis 5c, there was a significant main effect of reporter ($F(3,178) =23.404$, $p<.000$). However, follow-up LSD pairwise comparison found no significant difference between twin 1 and twin 2 (mean = .67, sd = .35, p = .60). Follow-up LSD pairwise comparison also found no significant differences between mothers and fathers (mean = .09, sd = .32, p = .77). However there was a significant difference between mother and twin 1 (mean difference = 1.89, sd. err. = .39, $p < .000$), mother and twin 2 (mean difference = 2.56, sd. err. = .41,$p<.000$), father and twin 1 (mean difference = 1.80, sd. Err. = .39, $p < .000$), and father and twin 2 (mean diff. = 2.47, sd. Err. = .40, $p < .000$). Although it wasn't hypothesized, a significant reporter by target interaction effect occurred ($F(3,178) = 43.888$, $p<.000$).

No other effects for the mean or interactions were significant.

Table 16

Means and Standard Deviations for Twinship Status and Gender-Rivalry

Reporter	Target	MZ or DZ	Gender	M	SD	n
Mother	T1 to T2	MZ Twin	Male	17.186	4.061	43
			Female	15.933	4.952	45
			Total	16.546	4.556	88
Mother	T1 to T2	DZ Twin	Male	18.920	4.704	48
			Female	17.146	4.510	48
			Total	18.033	4.670	96
Mother	T1 to T2	Total	Male	18.101	4.473	91
			Female	16.559	4.742	93
			Total	17.322	4.663	184
Mother	T2 to T1	MZ Twin	Male	16.954	4.424	43
			Female	16.378	5.131	45
			Total	16.660	4.780	88
Mother	T2 to T1	DZ Twin	Male	18.472	5.185	48
			Female	17.479	4.816	48
			Total	17.976	5.003	96
Mother	T2 to T1	Total	Male	17.755	4.874	91
			Female	16.946	4.975	93
			Total	17.346	4.928	184

Table 16 continued

Means and Standard Deviations for Twinship Status and Gender – Rivalry

Reporter	Target	MZ or DZ	Gender	M	SD	n
Father	T1 to T2	MZ Twin	Male	16.628	3.645	43
			Female	17.489	4.077	45
			Total	17.068	3.874	88
Father	T1 to T2	DZ Twin	Male	18.708	3.990	48
			Female	16.580	4.397	48
			Total	17.644	4.311	96
Father	T1 to T2	Total	Male	17.725	3.950	91
			Female	17.020	4.246	93
			Total	17.369	4.107	184
Father	T2 to T1	MZ Twin	Male	16.372	4.006	43
			Female	17.337	4.663	45
			Total	16.866	4.357	88
Father	T2 to T1	DZ Twin	Male	18.313	5.041	48
			Female	16.313	4.263	48
			Total	17.313	4.751	96
Father	T2 to T1	Total	Male	17.396	4.660	91
			Female	16.808	4.467	93
			Total	17.099	4.560	184

Table 16 continued

Means and Standard Deviations for Twinship Status and Gender – Rivalry

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 1	T1 to T2	MZ Twin	Male	14.640	3.741	43
			Female	13.656	4.000	45
			Total	14.136	3.884	88
Twin 1	T1 to T2	DZ Twin	Male	14.764	4.715	48
			Female	14.625	3.807	48
			Total	14.694	4.263	96
Twin 1	T1 to T2	Total	Male	14.705	4.260	91
			Female	14.156	3.912	93
			Total	14.428	4.085	184
Twin 1	T2 to T1	MZ Twin	Male	15.643	4.638	43
			Female	15.656	4.545	45
			Total	15.650	4.564	88
Twin 1	T2 to T1	DZ Twin	Male	17.167	6.211	48
			Female	17.191	4.768	48
			Total	17.179	5.507	96
Twin 1	T2 to T1	Total	Male	16.447	5.547	91
			Female	16.448	4.700	93
			Total	16.448	5.122	184

Table 16 continued

Means and Standard Deviations for Twinship Status and Gender – Rivalry

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 2	T1 to T2	MZ Twin	Male	15.764	4.423	43
			Female	14.619	4.896	45
			Total	15.180	4.680	88
Twin 2	T1 to T2	DZ Twin	Male	16.167	5.525	48
			Female	16.264	4.919	48
			Total	16.215	5.203	96
Twin 2	T1 to T2	Total	Male	15.978	5.011	91
			Female	15.468	4.951	93
			Total	15.720	4.974	184
Twin 2	T2 to T1	MZ Twin	Male	14.209	4.285	43
			Female	12.978	3.720	45
			Total	13.580	4.031	88
Twin 2	T2 to T1	DZ Twin	Male	14.215	4.965	48
			Female	13.778	4.404	48
			Total	13.997	4.673	96
Twin 2	T2 to T1	Total	Male	14.213	4.630	91
			Female	13.391	4.085	93
			Total	13.797	4.371	184

Table 17

ANOVA Results for Rivalry

Tests of Between-Subjects Effects - Rivalry

Source	SS	df	MS	F	p	eta^2
Twinship	308.149	1	308.149	4.554	.034*	.024
Gender	164.392	1	164.392	2.429	.121	.013
Twinship X Gender	22.903	1	22.903	.338	.561	.002
Error	12180.496	180	67.669			

* denotes significance at .05 level

Table 17 continued

Tests of Within-Subject Effects - Rivalry

Source	SS	df	MS	F	Sig.	eta^2
Reporter	1827.545	3	666.509	23.404	.000	.087
Reporter X Twinship	40.201	3	14.662	.515	.656	.002
Reporter X Gender	36.456	3	13.295	.467	.688	.002
Reporter X Twinship X Gender	213.678	3	77.929	2.596	.054	.010
Error (reporter)	14055.567	540	26.029			
Target	.583	1	.583	.087	.769	.000
Target X Twinship	2.985	1	.030	.004	.947	.000
Target X Gender	7.150	1	7.150	1.065	.303	.000
Target X Twinship X Gender	1.918	1	1.918	.286	.594	.000
Error (target)	1208.056	150	6.711			

* denotes significance at .05 level

Table 17 continued

Tests of Within-Subject Effects - Rivalry

Source	SS	df	MS	F	Sig.	eta^2
Reporter X Target	705.331	3	282.724	43.888	.000	.034
Reporter X Target X Twinship	31.910	3	12.791	1.986	.127	.002
Reporter X Target X Gender	15.259	3	6.116	.949	.404	.001
Reporter X Target X Twinship X Gender	3.301	3	1.323	.205	.859	.000
Error (reporter X Target)	2892.792	540	6.442			

* denotes significance at .05 level

Table 18

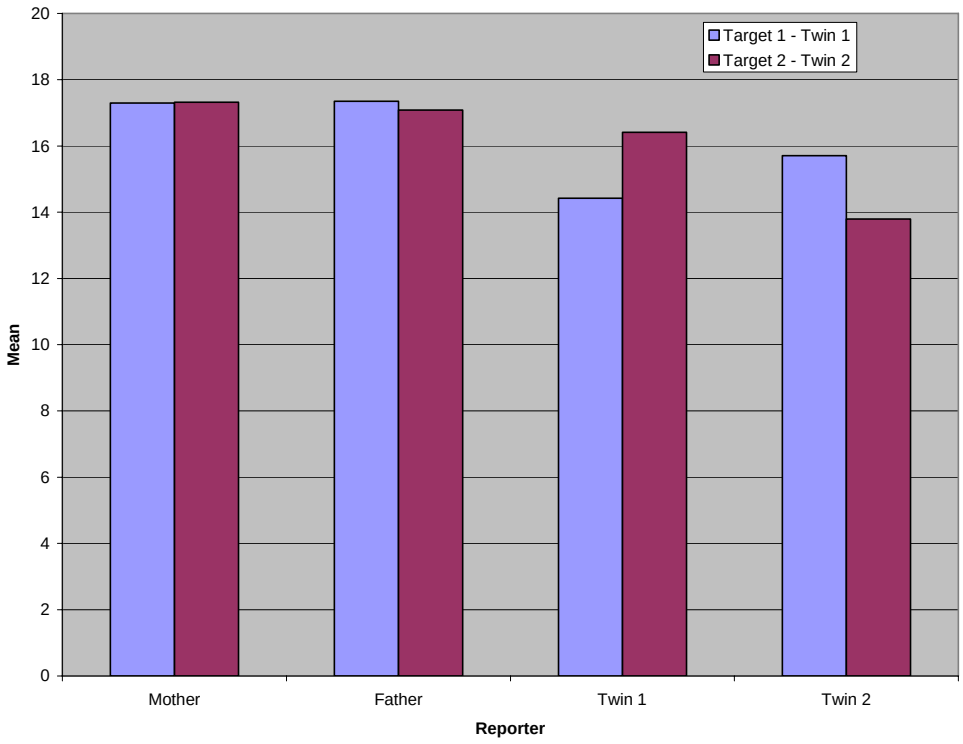
LSD Pairwise Comparison for Reporter - Rivalry

Reporter	Reporter	Mean Diff. (st. error)	Sig.	95 % Confidence Intervals Lower	Upper
Mother	Father	.091 (.32)	.774	-.53	.72
	Twin1	1.891* (.39)	.000	1.12	2.66
	Twin 2	2.559* (.41)	.000	1.76	3.34
Father	Mother	-.091 (.32)	.774	-.72	.53
	Twin 1	1.80*(.39)	.000	1.04	2.56
	Twin 2	2.47 *(.40)	.000	1.68	3.26
Twin 1	Mother	-1.891*(.39)	.000	-2.66	-1.12
	Father	-1.80*(.39)	.000	-2.65	-1.04
	Twin 2	.668 (.35)	.060	-.03	1.36
Twin 2	Mother	-2.56*(.41)	.000	-3.36	-1.76
	Father	-2.47*(.40)	.000	-3.26	-1.68
	Twin 1	-.668(.35)	.060	-1.36	.03

* significant at .05 level

Figure 6

Interaction Effect of Reporter by Target – Rivalry



Hypothesis 5a predicted that there would be overall differences between MZ and DZss twins on the construct of rivalry. As Table 17 shows, there was a statistically significant difference between twinship status on the construct of rivalry. It was further hypothesized that DZss twins would demonstrate and report greater levels of rivalry than MZ twins. The findings confirm that DZss twins demonstrated and reported statistically significant higher levels of rivalry than MZ twins. Hypothesis 5a was confirmed.

Hypothesis 5b predicted that the there would be no statistically significant difference of gender on the construct of rivalry. The null hypothesis was confirmed. As Table 17 represents, gender is not a main effect on the construct of rivalry.

Hypothesis 5c predicted that there would be differences between reporter; specifically, MZ twins would perceive the level of rivalry more similarly than would DZss twins. Table 17 reveals that there is a main effect of reporter. In Table 18, the LSD pairwise comparison analysis demonstrates that the difference in reporter is not related to the twins' perception, but rather, the parental perception. As presented in Table 18, mothers viewed the level of rivalry in the twin relationship similarly to the fathers. The analysis also demonstrates that while mothers and fathers report the level of rivalry similarly to each other, they perceive the relationship statistically different than both twins. There was no reporter by twinship interaction.

Table 17 presents the finding that there is an interaction effect of reporter by target. As represented in Figure 6, twins report lower levels of rivalry when reporting on themselves as compared to the level of rivalry they report for their co-twin. There was no significant interaction when the mother or father reported on each twin.

RESULTS FOR AGGRESSION

Table 19 reports the means and standard deviations for aggression. Table 20 summarizes the ANOVA results for the analyses. Table 20 includes the tests of between-subject effects as well as the within–subject effects for aggression and the measure of explained variance (eta^2). Figure 7 represents the interaction effect of reporter by target.

For aggression, as hypothesized, there was a significant main effect of twinship ($F(1,186) = 4.460$, $p=.036$), with aggression being significantly greater for DZss twins (mean = 14.39, sd = .24) than for MZ twins (mean = 13.66, sd = .25). As predicted, the null hypothesis was confirmed, there was no main effect of gender. With regards to hypothesis 6c, there was no significant main effect of reporter, therefore the hypothesis was rejected. Although it wasn't hypothesized, there was a significant interaction effect of reporter by target ($F(3,184) = 22.959$, $p<.000$). The interaction effect of reporter by target found a significant effect when twin 1 reported on twin 2's aggression (14.7, sd = .27) and when twin 2 reported on twin 1's aggression (14.43, sd = .25).

Table 19

Means and Standard Deviations for Twinship Status and Gender- Aggression

Report	Target	MZ or DZ	Gender	M	SD	n
Mother	T1 to T2	MZ Twin	Male	13.990	2.964	46
			Female	13.255	3.039	47
			Total	13.618	3.009	93
Mother	T1 to T2	DZ Twin	Male	15.265	3.701	49
			Female	13.787	2.910	48
			Total	14.534	3.398	97
Mother	T1 to T2	Total	Male	14.647	3.408	95
			Female	13.524	2.971	95
			Total	14.086	3.237	190
Mother	T2 to T1	MZ Twin	Male	13.821	3.268	46
			Female	12.830	3.416	47
			Total	13.320	3.362	93
Mother	T2 to T1	DZ Twin	Male	15.051	3.844	49
			Female	13.318	2.978	48
			Total	14.193	3.534	97
Mother	T2 to T1	Total	Male	14.455	3.611	95
			Female	13.076	3.194	95
			Total	13.766	3.469	190

Table 19 continued

Means and Standard Deviations for Twinship Status and Gender-Aggression

Reporter	Target	MZ or DZ	Gender	M	SD	n
Father	T1 to T2	MZ Twin	Male	13.783	2.913	46
			Female	13.596	2.374	47
			Total	13.688	2.642	93
Father	T1 to T2	DZ Twin	Male	14.674	3.292	49
			Female	13.604	2.944	48
			Total	14.144	3.155	97
Father	T1 to T2	Total	Male	14.242	3.130	95
			Female	13.600	2.663	95
			Total	13.921	2.916	190
Father	T2 to T1	MZ Twin	Male	13.788	3.270	46
			Female	13.468	2.718	47
			Total	13.626	2.991	93
Father	T2 to T1	DZ Twin	Male	14.408	3.822	49
			Female	13.417	3.357	48
			Total	13.918	3.615	97
Father	T2 to T1	Total	Male	14.108	3.560	95
			Female	13.442	3.041	95
			Total	13.775	3.319	190

Table 19 continued

Means and Standard Deviations for Twinship Status and Gender-Aggression

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 1	T1 to T2	MZ Twin	Male	13.761	3.135	46
			Female	13.277	3.248	47
			Total	13.516	3.185	93
Twin 1	T1 to T2	DZ Twin	Male	14.209	3.934	49
			Female	13.787	3.148	48
			Total	14.000	3.555	97
Twin 1	T1 to T2	Total	Male	13.992	3.558	95
			Female	13.534	3.192	95
			Total	13.763	3.379	190
Twin 1	T2 to T1	MZ Twin	Male	13.929	3.447	46
			Female	14.298	3.426	47
			Total	14.116	3.423	93
Twin 1	T2 to T1	DZ Twin	Male	15.367	4.386	49
			Female	15.188	3.541	48
			Total	15.278	3.971	97
Twin	T2 to T1	Total	Male	14.671	4.004	95
			Female	14.747	3,495	95
			Total	14.709	3.748	190

Table 19 continued

Means and Standard Deviations for Twinship Status and Gender-Aggression

Reporter	Target	MZ or DZ	Gender	M	SD	n
Twin 2	T1 to T2	MZ Twin	Male	14.065	3.276	46
			Female	14.043	3.816	47
			Total	14.054	3.540	93
Twin 2	T1 to T2	DZ Twin	Male	14.694	3.374	49
			Female	14.922	3.364	48
			Total	14.807	3.353	97
Twin 2	T1 to T2	Total	Male	14.390	3.324	95
			Female	14.487	3.603	95
			Total	14.438	3.457	190
Twin 2	T2 to T1	MZ Twin	Male	13.239	3.212	46
			Female	13.346	3.458	47
			Total	13.293	3.321	93
Twin 2	T2 to T1	DZ Twin	Male	14.362	3.978	49
			Female	14.125	3.728	48
			Total	14.245	3.838	97
Twin 2	T2 to T1	Total	Male	13.818	3.652	95
			Female	13.740	3.600	95
			Total	13.779	3.616	190

Table 20

ANOVA Results for Aggression

Tests of Between-Subjects Effects - Aggression

Source	SS	df	MS	F	p	eta^2
Twinship	202.728	1	202.728	4.460	.036*	.031
Gender	98.495	1	98.495	2.167	.143	.011
Twinship X Gender	19.457	1	9.457	.428	.514	.002
Error	8454.547	186	45.455			

*denotes significance at .05 level

Table 20 continued

Tests of Within-Subjects Effects – Aggression

Source	SS	df	MS	F	p	eta^2
Reporter	34.905	3	13.098	.935	.415	.004
Reporter X Twinship	16.909	3	6.345	.453	.692	.002
Reporter X Gender	88.353	3	33.155	2.367	.078	.010
Reporter X Twinship X Gender	9.461	3	3.550	.253	.836	.001
Error (reporter)	6944.303	558	14.010			
Target	.854	1	.854	.301	.584	.000
Target X Twinship	2.681	1	2.681	.957	.329	.000
Target X Gender	.055	1	.055	.020	.889	.000
Target X Twinship X Gender	1.457	1	1.457	.520	.472	.000
Error (target)	521.098	186	2.802			

* denotes significance at .05 level

Table 20 continued

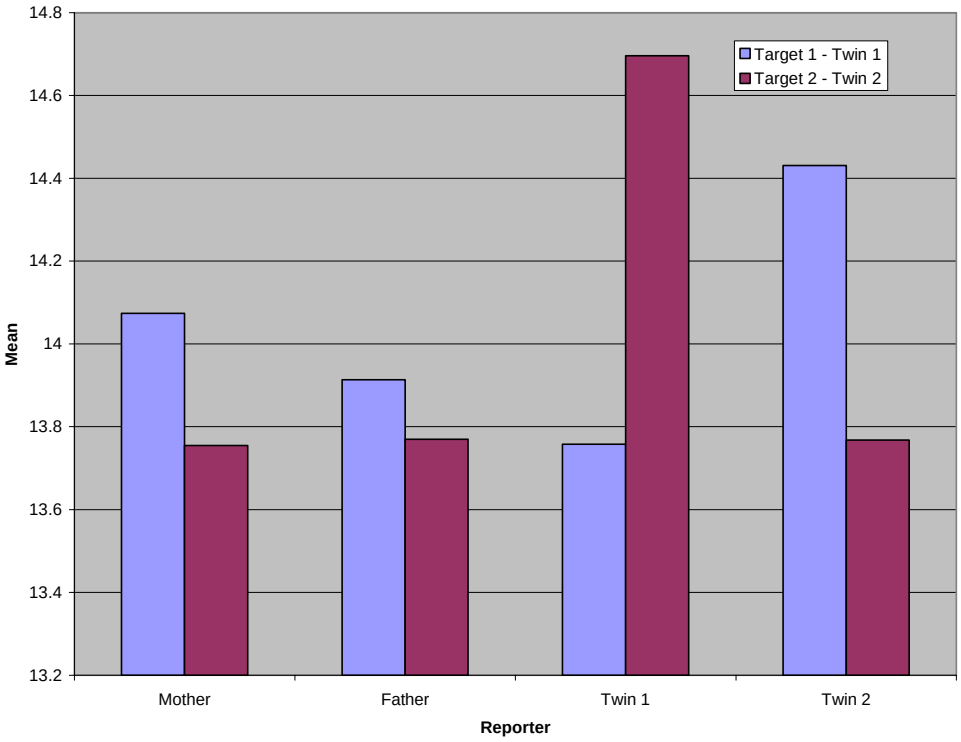
Tests of Within-Subjects Effects – Aggression

Source	SS	df	MS	F	p	eta^2
Reporter X Target	135.916	3	48.813	22.959	.000*	.015
Reporter X Target X Twinship	10.067	3	3.615	1.701	.166	.001
Reporter X Target X Gender	9.309	3	3.343	1.573	.198	.001
Reporter X Target X Twinship X Gender	3.112	3	1.118	.526	.651	.000
Error (reporter X Target)	1101.092	558	2.126			

* denotes significance at .05 level

Figure 7

Interaction Effect of Reporter by Target – Aggression



Hypothesis 6a predicted that there would be overall differences between MZ and DZss twins on the construct of aggression. As Table 20 shows, there was a statistically significant difference between twinship status on the construct of aggression. It was further hypothesized that DZss twins would demonstrate and report greater levels of aggression than MZ twins. The results were confirmed in that DZss twins did demonstrate and report statistically significant higher levels of aggression than did the MZ twins. Hypothesis 6a was confirmed.

Hypothesis 6b predicted that gender would not be a main effect on the construct of aggression. The null hypothesis was supported. As presented in Table 20, gender was not a main effect on the construct of aggression.

Hypothesis 6c predicted that reporter differences would occur, specifically, MZ twins would perceive the level of aggression more similarly than DZss twins. Hypothesis 6c was not upheld. As presented in Table 20, reporter was not a main effect on the construct of aggression.

No interaction effects were hypothesized, however as reported in Table 20 an interaction effect of reporter by target was found. As represented in Figure 7, the interaction of the reporter by target suggests that twins report lower levels of aggression when reporting on themselves as compared to when they report on the level of aggression for their co-twin. This finding suggests a possible self-reported halo effect may be occurring. There was no significant interaction when the mother or father reported on each twin.

CHAPTER 5: DISCUSSION

The main focus of this study was to examine the similarities and differences between the adolescent sibling relationship of MZ twins and DZss twins in the areas of empathy, companionship, directiveness/teaching, avoidance, rivalry, and aggression as measured by the *Sibling Inventory of Behavior – Expanded Version* (Anderson & Rice, 1992). Along with exploring main effect differences between MZ and DZss twins, the study also investigated gender differences, and differences in perceptions of the individual twins in the dyad. In this chapter, the results of the current study will be summarized by hypothesis. The overall findings will be integrated with previous research and implications of the findings. Finally, limitations of the present study and implications for future research will be suggested.

OVERVIEW OF HYPOTHESES

Hypothesis 1a predicting significant differences between MZ and DZss twins on the construct of empathy, with MZ twins demonstrating and reporting higher levels of empathy than DZss twins was supported. Twinship status was significant with MZ twins demonstrating and reporting higher levels of empathy than do DZss twins.

Hypothesis 1b predicting significant differences between female MZ and DZss twins and male MZ and DZss twins, with family MZ and DZss twins reporting and demonstrating higher levels of empathy than male MZ and DZss twins was also supported. There was a significant difference between female MZ and DZss twins and male MZ and DZss twins, and females reported and demonstrated higher levels of empathy than males.

Hypothesis 1c predicting significant differences between reporters on the construct of empathy, with MZ twins reporting more similarly than DZ twins was not supported. While reporter differences occurred, regardless of twinship status, there were no significant differences between twin 1 and twin 2's reports on level of empathy within the twin relationship.

Hypothesis 2a predicting significant differences between MZ and DZss twins on the construct of companionship, with MZ twins demonstrating and reporting higher levels of companionship than DZss twins was supported. Twinship status was significant with MZ twins demonstrating and reporting higher levels of companionship than do DZss twins.

Hypothesis 2b predicting significant differences between female MZ and DZss twins and male MZ and DZss twins, with female MZ and DZss twins reporting and demonstrating higher levels of companionship than male MZ and DZss twins was also supported. There was a significant difference between female MZ and DZss twins and male MZ and DZss twins, and females reported and demonstrated higher levels of companionship than males.

Hypothesis 2c predicting significant differences between reporters on the construct of companionship, with MZ twins reporting more similarly than DZ twins was not supported. While reporter differences occurred, regardless of twinship status, there were no significant differences between twin 1 and twin 2's reports on level of companionship within the twin relationship.

Hypothesis 3a predicting significant differences between MZ and DZss twins on the construct of directiveness/teaching, with MZ twins demonstrating and reporting

higher levels of directiveness/teaching than DZss twins was supported. Twinship status was significant with MZ twins demonstrating and reporting higher levels of empathy than DZss twins.

Hypothesis 3b predicting significant differences between female MZ and DZss twins and male MZ and DZss twins, with female MZ and DZss twins reporting and demonstrating higher levels of directiveness/teaching than male MZ and DZss twins was also supported. There was a significant difference between female MZ and DZss twins and male MZ and DZss twins, with females reporting and demonstrating higher levels of directiveness/teaching than males.

Hypothesis 3c predicting significant differences between reporters on the construct of directiveness/teaching, with MZ twins reporting more similarly than DZ twins was not supported. While reporter differences occurred, regardless of twinship status, there were no significant differences between twin 1 and twin 2's reports on level of directiveness/teaching within the twin relationship.

Hypothesis 4a predicting significant differences between MZ and DZss twins on the construct of avoidance, with DZss twins demonstrating and reporting higher levels of empathy than MZ twins was supported. Twinship status was significant with DZss twins demonstrating and reporting higher levels of avoidance than MZ twins.

Hypothesis 4b predicting no significant difference between female MZ and DZss twins and male MZ and DZss twins was supported.

Hypothesis 4c predicting significant differences between reporters on the construct of avoidance, with MZ twins reporting more similarly than DZ twins was not

supported. While reporter differences occurred, regardless of twinship status, there were no significant differences between twin 1 and twin 2's reports on level of avoidance.

Hypothesis 5a predicting significant differences between MZ and DZss twins on the construct of rivalry, with DZss twins demonstrating and reporting higher levels of rivalry than MZ twins was supported. Twinship status was significant with DZss twins demonstrating and reporting higher levels of rivalry than MZ twins.

Hypothesis 5b predicting no significant difference between female MZ and DZss twins and male MZ and DZss twins on the construct of rivalry was supported.

Hypothesis 5c predicting significant differences between reporters on the construct of rivalry, with MZ twins reporting more similarly than DZ twins was not supported. While reporter differences occurred, regardless of twinship status, there were no significant differences between twin 1 and twin 2's reports on level of rivalry.

Hypothesis 6a predicting significant differences between MZ and DZss twins on the construct of aggression, with DZss twins demonstrating and reporting higher levels of aggression than MZ twins was supported. Twinship status was significant with DZss twins demonstrating and reporting higher levels of aggression than MZ twins.

Hypothesis 6b predicting no significant difference between female MZ and DZss twins and male MZ and DZss twins on the construct of aggression was supported.

Hypothesis 6c predicting significant differences between reporters on the construct of aggression, with MZ twins reporting more similarly than DZ twins was not supported. There were no reporter differences for aggression.

While many of the effect sizes were small, they were consistent across constructs. On each construct, there was a small effect size for twinship status and reporter by target

effect size, however there was a larger effect size for reporter. These consistent differences lend themselves to further support the rationale for utilizing multiple reporters when conducting twin research.

INTEGRATION OF RESULTS WITH THE LITERATURE

Overall, hypotheses 1a, 2a, 3a, 4a, 5a, and 6a all predicted that there would be significant differences between the MZ twin relationship and the DZss twin relationship on the six constructs of empathy, companionship, directiveness/teaching, avoidance, rivalry and aggression. More specifically, hypotheses 1a, 2a, and 3a predicted that on the positive constructs of empathy, companionship, and directiveness/teaching, MZ twins would report and demonstrate significantly higher levels than DZss twins. While hypotheses 1a and 2a were supported, hypothesis 3a was rejected. Hypotheses 4a, 5a, and 6a predicted that MZ twins would report and demonstrate lower levels of the negative constructs of avoidance, rivalry, and aggression than would DZss twins. All three hypotheses were confirmed.

Overall, it is not surprising that significant differences were found between adolescent MZ and DZss twins. The research comparing MZ and DZ twins is sparse, and a majority of the prior research is based on case studies (von Bracken, 1934; Ainslie, 1985), observational data (Segal, 1982; 1985; 1999), retrospective anecdotal interviews with adults (Ainslie, 1985; Klien, 2003), and data concerning twins below the age of 6 years (Koch, 1966). However, the findings of the current study suggest that the MZ twin relationship differs from the DZ twin relationship. Important to this general finding is the suggestion proposed by Hay(1999) and Segal (1999) that twins should not be studied as a

large homogeneous group, but rather as individual subgroups, i.e. MZ, DZss, and DZos. The differences found in the current study support the idea that in order to fully understand the twin relationship and to obtain a complete picture of twins, they should be considered separate groups with distinct characteristics.

The findings that MZ twins demonstrate and report higher levels of empathy and companionship, and lower levels of rivalry, avoidance, and aggression were not startling. While there are no prior studies that investigate the specific constructs utilized in the current study, other studies have explored concepts embedded in the current constructs, i.e. closeness and cooperation (Koch, 1966, Segal, 1982, 1984, 1988, 1999; von Bracken, 1934). Helmut von Bracken (1934) found that when elementary school-aged twins, were asked to work individually on a math task, and one twin was more skilled than the other, the more skilled twin would wait for the co-twin to catch up before finishing the task. On the other hand, DZ twins, when matched on skills, would not wait, but instead would hurry ahead in order to finish first before their co-twin. Also noted was the fact that when the less skilled DZ twin got behind on the task, he or she would lose all motivation finding it difficult to complete the task at all, while the less skilled MZ twins would remain encouraged and task driven, due in part to the co-twins encouragement and attitude. When the MZ and DZ twins were matched on skill level, the MZ twins were observed synchronizing their pacing in order to complete the task at the same time, while the individual DZ twins would become rivals and competitive, at times making up answers in order to finish first. These studies support the present study's findings that MZ twins report and demonstrate greater levels of empathy, in that MZ twins were observed wanting their co-twin to succeed, being pleased by their co-twins' progress, being

concerned about their co-twins' welfare and happiness, and showing sympathy when things were difficult for their co-twin. In contrast, the DZ twins were observed in competitive and rivalrous activities such as speeding ahead, and completing the task quickly regardless of correctness simply to gain recognition as being the first done. The present study also supports Segal's (1988) findings whereby when twins were observed working together on a puzzle, MZ twins shared pieces and placed the board in a mutually acceptable and accessible location with their co-twin, while DZ twins pulled the puzzle board to themselves, at times alienating their co-twin from working on the puzzle, by hiding pieces and not allow the co-twin to gather pieces to place on the puzzle. Also, DZ twins were observed shoving and pushing in order to gain access to the puzzle pieces and puzzle board. Segal (1984) also found that when twins were asked to earn points for themselves and their co-twin, MZ twins were observed working significantly harder for their co-twin than were the DZ twins (Segal, 1984). When twins of a wide range of ages were observed completing the Prisoner's Dilemma game, there were significant differences between MZ and DZ with MZ twins demonstrating more cooperation with each other, with the DZ twins demonstrating more agitation with each other (Segal & Hershberger, 1999). Further observational studies of elementary school aged children during recess also found that MZ twins exhibited significantly greater levels of physical and social closeness compared to DZ twins (Segal, 1984). At the younger end of the age spectrum, Koch's (1966) study, with twins' age 59 to 86 months, found that parents of MZ twins reported higher levels of social closeness for their twins than did parents of DZ twins. Segal (1999) notes that identical twins' ability to balance the close, while also being involved in typical sibling issues of rivalry and aggression, may create a scenario

whereby identical twins “may come closer than anyone to achieving the coordinated, harmonious relationship for which we all strive” (p.101).

While the information obtained from the prior studies does not specifically address the constructs of empathy, companionship, rivalry, aggression, or avoidance, the research does give insight into the differences between MZ and DZ twin relationships on these five constructs. A culmination of the research suggests that MZ twins demonstrate more positive qualities of sibling relationships, i.e. greater closeness, cooperation, sharing, proximity, sympathy, and kindness; while the DZ twin relationship portrays more of the disparaging aspects of the sibling relationship, i.e. agitation, shoving, excessive competition, lack of patience, and lesser degrees of proximity. Therefore, the present study supports the prior research that MZ twins report and demonstrate higher levels of the positive aspects of the sibling relationship, i.e. companionship and empathy, while DZ twins demonstrate and report higher levels of the negative aspects of the relationships, i.e. aggression, rivalry, and avoidance.

Although MZ twins report and demonstrate significantly higher levels of empathy and companionship, the presence of these positive aspects of the relationship do not negate the presence of rivalry, avoidance and aggression. In fact, several researchers note the importance of having a balance of both the positive and negative qualities embodied in the sibling relationship (Bank & Kahn, 1982; Brody, 1998; Grotevant & Cooper, 1986). Researchers have found that a balance of conflict and warmth in the sibling relationship is related to social-cognitive and behavioral competencies and to peer relationships and school adjustment (Brody, 1998; Hetherington, 1988). After all, a close relationship is not contingent upon the absence of negative affect and conflict (Wu Shortt

& Grottman, 1997). Segal (1999) notes that identical twins' ability to balance the closeness, while also being involved in typical sibling issues of rivalry and aggression may create a scenario whereby identical twins "may come closer than anyone to achieving the coordinated, harmonious relationship for which we all strive" (p. 101).

While the results concerning companionship, empathy, rivalry, aggression, and avoidance were not surprising, it was surprising to find that MZ twins did not have higher levels of directiveness/teaching when compared to DZss twins. While the construct of directiveness/teaching may embody certain aspects of Buhrmester and Furman's (1992) qualities of a sibling relationship, i.e. power, status, and managerial qualities, directiveness/teaching also includes the aspects of nurturer and helper. Therefore, it would seem logical that the positive aspects of the directiveness/teaching construct, coupled with the increased level of companionship and empathy reported and demonstrated by MZ twins, would results in an increase in the likelihood of MZ twins reporting and demonstrating higher levels of directiveness/teaching. However, increased directiveness/teaching for MZ twins was not supported in the present study.

One possible explanation of the present findings may be related to the idea that directiveness/teaching is more indicative of a fine balancing act which occurs within the twin relationship, regardless of twinship status. Sibling researchers, such as Buhrmester (1992), discuss the idea of role structures within the sibling relationship. While the roles may be complementary (Abromovitch, et al, 1986; Brody, et al, 1982, 1985; Buhrmester & Furman, 1985; Dunn & Kendrick, 1982; Hetherington, 1988; Vandell, et al, 1987), the level of asymmetry may be representative of the ordinal positioning and age spacing. In the twin dyad, ordinal positioning and age differentials are nonexistent; therefore, the

differences in directiveness/teaching are non-existent. Hence, power and status are equalized, overall creating a more symmetrical relationship, regardless of twinship status.

Another possibility for the lack of difference between MZ and DZss twins, with regards to directiveness/teaching may be related to the "seesaw" effect proposed by Schienfeld (1973). Schienfeld suggested that when one twin is "up" in power, the other is "down." Therefore, while power and role status exists within the relationship, the power switches when both twins feel it is appropriate. Schienfeld goes on to note that the switch in power may be related to twins' perception of each others' individual skills, or on the event or circumstance. Hence, while the relationship may, at times, be asymmetrical, overall, it equals itself out, with the twins being in control of the balancing components. Therefore while asymmetry may exist, during which each twin acquires the role of teacher/director, the balancing of the power and status within the relationship stays in flux whereby no one person possesses more than the other resulting in a relationship which appears to be more symmetrical. Therefore, while it is important to continue to investigate the differences between MZ and DZ twins, it is also important to remember that there are also overarching issues which are not affected by the genetic differences, but rather effected by the lack of age difference between the twins.

Although differences in the quality of the adolescent sibling relationship appear to exist between MZ and DZss, it is uncertain as to why the differences may occur. Are the differences related to the genetic component and the idea presented by Segal (1999) that the higher level of cooperation and the more positive aspects of the MZ twin relationship are due to MZ twins inherent disposition that, "helping one's twin is like helping oneself, i.e. helping one's own genes to survive" (p. 101)? Or, are the differences due to the idea

that MZ twins can simply intuit their co-twins' behaviors; thereby, increasing the level of cooperation, and consequently increasing the more positive aspects of the relationship (Waller, 1990)? Do MZ twins genetically have a closer bond that predisposes them to a more positive relationship with each other, or do MZ twins have a more positive relationship with each other thereby creating a closer bond? Or, are the higher levels of the positive aspects in the MZ relationship due more to environmental factors? Preedy (1999) suggests that twins are confronted with and often embody what Koch (1966) coined the "primma donna effect." Preedy suggests that the increased attention and interest which is given to twins, and even more so to MZ twins, plays a role in that the twins need to represent themselves as a close and unified team in order to continue to gain attention and interest from others. Or, are the higher levels of the positive aspects of the MZ twin relationship less about the actual twinship persona and more about the twinship embedded in the siblingship? Howe, et al (2001) suggest that siblings whose social worlds overlap, go to the same school, know each other's friends, and participate in similar activities, have an increased level of warmth, closeness and intimacies; therefore, the likelihood of MZ twins being privy to the environmental variables of closeness creates a greater sense of the positive qualities of the sibling relationship such as companionship and empathy and a lesser sense of the negative qualities of aggression, rivalry, and avoidance? Regardless of the reason or reasons for the differing levels of the positive and negative qualities of the sibling relationship demonstrated and reported by MZ twins, this study suggests the phenomenon occurs. Therefore, further research would be beneficial in discerning the factors that influence the differences that occur between the MZ and DZss twin relationship.

Hypotheses 1b, 2b, 3b, 4b, 5b, and 6b investigated the differences between male adolescent MZ and DZss twins and female MZ and DZss twins. It was hypothesized that female MZ and DZss twins would differ on the constructs of empathy, companionship, teaching/directiveness, and avoidance. Specifically, it was predicted that female MZ and DZss twins would demonstrate and report higher levels of empathy, companionship, and directiveness/teaching, and lower levels of avoidance than male MZ and DZss twins. Hypotheses 5b and 6b predicted there would be no significant difference between female MZ and DZss twins and male MZ and DZss twins on the constructs of rivalry and aggression, respectively. The results supported the prediction that female MZ and DZss twins demonstrate and report higher levels of empathy, companionship, and directiveness/teaching, while male MZ and DZss twins demonstrated and reported higher levels of avoidance. It was also found that there were no differences between female MZ and DZss twins and male MZ and DZss twins on the constructs of rivalry and aggression.

Again, prior research has not explored the specific constructs utilized in the current study, but findings concerning related characteristics, such as closeness, warmth, emotional intimacy, and confiding, help explain the role gender plays in the adolescent MZ and DZss twin relationship. Adolescence is a developmental period in which many social and physical transitions occur. As the social arena changes, Hay (1999) suggests that female twins are more apt to embody Koch's (1966) "primma donna effect" in order to gain or continue to gain attention and interest from others; thereby demonstrating and reporting higher levels of closeness, in that the relationship aides in their twin persona and uniqueness. The closeness is related to the increased level of companionship. It is

also possible that the increased need to rely on the uniqueness of their relationship as a defining element may also increase their empathy with and for each other.

Along with social changes, biological changes also occur during adolescence. Buckler (1999) found that due to genetic similarity, MZ twins are more likely to simultaneously reach and transition through the stages of puberty, while DZss twins may physically mature within a general timeframe, but are less likely to progress through puberty as synchronously as MZ twins. Howe, et al's (1999) sibling research found that female siblings demonstrate higher levels of confiding than male siblings. The research that suggests that MZ twins transition through puberty at the same rate, coupled with Howe et al's report that female siblings confide more than male siblings combines to create a scenario whereby female twins may be more prone to utilize their co-twin as a companion, emotional support, and confidant than do male twins in order to navigate and cope with the difficulties of adolescence. Therefore, the fact that the adolescent female twins report higher levels of empathy and companionship than male twins may be reflective of their willingness to share and use the twin relationship as a support tool and a basis for camaraderie during a difficult transitional time. Interestingly, research with adult female twins has also found that female twins were more apt to be and stay close into adulthood (Scheinfeld, 1973) than were male twins.

The current findings indicating higher levels of empathy and companionship in the female MZ and DZss twin relationship than in the male MZ and DZss twin relationship does not presuppose that there are lower levels of rivalry and aggression in female MZ and DZss twins, when compared to male MZ and DZss twins. Preedy (1999) and Hay (1999) suggested that the female twins' increased levels of closeness might lend

itself to higher levels of rivalry within the relationship. Preedy reports that while female twins may be closer, they also can feel badly when they do not receive help and aid from their twin, and, therefore, may report and demonstrate high levels of rivalry. It is possible that the lack of difference between females and males on the construct of rivalry and aggression may be due to an equalization process whereby the females' increased levels of companionship and empathy also create an increase in the levels of rivalry and aggression. In fact, when the rivalry and aggression qualities are compared they equal those found in male twins; thereby negating any findings of differing levels of rivalry when compared to same-sex male MZ/DZ twins. Therefore, the lack of difference between female and male MZ and DZss twins on the constructs of rivalry and aggression are not surprising.

The gender difference in levels of directiveness/teaching may also be due to the higher levels of companionship and empathy of female MZ/DZ twins. The increased companionship and closeness may create a more open relationship whereby the female twins are more open to instruction and input from their co- twin. However, the increased levels of directiveness/teaching for female twin pairs may also be related to the questions asked in the utilized measure. Possibly, the questions may be more reflective of feminine characteristics than male, i.e. baby sits and cares for, and helps adjust to a new situation.

A further possible explanation for the findings that female MZ/DZ twins demonstrate and report higher levels of empathy, companionship, and directiveness/teaching as compared to male MZ and DZss twins, may be again be related to the measure. Female MZ and DZ twins may have a greater propensity to endorse items which are related to showing sympathy for a twin, trying to comfort a twin, making

plans that include a twin, share secrets with a twin, teach a twin a new skill, and/or baby-sit and care for a twin. Each of the prior statements coincides to aspects of the items that comprise the various constructs of empathy, companionship and directiveness/teaching. Therefore, it is difficult to pinpoint if the gender differences found in the study are related to actual gender differences in actions, or related to differences in a female adolescent's willingness to report nurturing, caring, and intimate details of one's sibling relationship. As with sibling research in general, gender issues are an area in which further research is necessary in order to accurately portray the effects of gender on the sibling, twin or nontwin, relationship.

Although the interaction of twinship status and gender was not specifically hypothesized in the present study, the data analysis resulted in a lack of interaction with regards to twinship status and gender. Therefore, it can be surmised that there may be a myth that male MZ twins are more rivalrous and aggressive than other twin pairs. The current data does not support this myth. In fact, the data found that twinship and gender do not interact to create any differences between male MZ, female MZ, male DZ, and/or female DZ twins. Therefore, it appears that gender coupled with twinship status is less a variable to be reckoned with than is simply gender.

Hypotheses 1c, 2c, 3c, 4c, 5c, and 6c, predicted that individual twins within the MZ twin relationship would view the relationship more similarly than individual twins within the DZss twin relationship. These hypotheses were not supported by the findings.

The finding that MZ twins do not have higher similarities in their perception of the twin relationship is startling, in that prior research which investigated the differences between MZ and DZ twins' experience of the relationship found that MZ twins perceived

the relationship more similarly than DZ twins (Ainslie, 1985; Klien, 2003; Loehlin & Nichole, 1976). Ainslie's (1985) and Klien's (2003) interview based research found that MZ twins viewed the relationship more similarly than DZ twins. Loehlin and Nichole's (1976) study of high school twins found, that as a group, MZ and DZ twins did not differ in their feelings about being a twin, however, within pair results found that MZ twins were more likely to agree with each other about the experience of twinship. Specifically, within DZ twin pairs, one twin was more content with the relationship than the other, thereby creating within group differences. Preedy (1999) also found that MZ twins were more likely to agree on both the levels of positive and negative aspects of the twin relationship than were DZ twins again suggesting that there are differences between how each twin within the DZ twin relationship perceives the relationship.

The contradictory findings of the current study with the prior research findings may be related to methodological differences between the studies. First, the present study did not rely on interviews, but rather utilized paper-pencil measures whereby each twin was asked to complete the questionnaire while in a separate room from their co-twin. Also the type of questions asked in each study differed. In the prior studies, twins were asked more generalized questions about their feelings and perceptions concerning the overall twin relationship. Also, at times, only one twin provided input. In the current study, each twin was asked more specific questions pertaining to specific aspects and qualities of the relationship, often related to behaviors and actions of themself or their twin. Due to the myriad of differences between research methods and issues addressed, the final results of all of the perception studies suggest the need for further research in the

area of twins' views and perceptions concerning their beliefs and feelings about their relationship.

While the present study was initially focused on the reporter differences between the individual twins, the findings regarding the mothers' and fathers' perceptions warrant discussion. As mentioned earlier, there was no significant difference between twin one and twin two's report of the relationship, suggesting that twins, overall, viewed the qualities of the relationship similarly. Similarly, on the constructs of rivalry, avoidance, companionship, and directiveness/teaching there were no significant differences between mothers' report and fathers' report. While parents reported the relationship similarly to each other, both parents differed from both twins on the constructs of rivalry, avoidance, companionship, and directiveness/teaching. However, on the construct of empathy, while both twins reported the relationship similarly, mothers and fathers did not report similarly to each other or to the twins. Interestingly, on the construct of avoidance, mothers' and fathers' reported the relationship similarly, with fathers also reporting similarly to both twins. Therefore, only the mothers' perceived the quality of avoidance differently than the other three family members. Interestingly, on the construct of aggression there was no reporter effect.

The finding that all family members report similarly on the construct of aggression may be related to the fact that aggression is a tangible, observable behavior which is either observed or not, i.e. has physical fights, argues, annoys others. However, the other constructs (rivalry, avoidance, companionship, empathy, and directiveness/teaching) have some element of intangible, unobservable emotional component, i.e. is jealous, is ashamed, accepts sibling, is embarrassed, is pleased with

progress of sibling, helps sibling adjust. The ability to recall those more observable actions may be more readily accessible to all of the family members' recollection than are the less tangible aspects of the sibling relationship. It is also possible that the difference in reporter accounts may be representative of the differing ways in which a less tangible response or interaction may be interpreted, i.e. an empathetic or avoidant reaction, compared to the more tangible acts of aggression which leave less room for interpretation.

Related to this phenomenon of observable, tangible aspects versus unobservable, intangible aspects of the twin relationship are the findings for the constructs of empathy and avoidance. On the construct of empathy, fathers and mothers differ from each other, as well as differing from each twin. On avoidance, fathers and mothers differ, but fathers do not differ from either twin. Interestingly, on both empathy and avoidance the fathers perceive the construct in the same direction as both twins. Therefore, the fathers' and both twins' perceive the relationship more similarly on these two constructs.

One possibility for this finding may be related to the mothers' desire to see the twin relationship more positively, hence the perception of increased levels of empathy and decreased levels of avoidance. Overall, the mothers' reports suggest that they see the twinship as more positive, in that they report higher levels of companionship, empathy, and directiveness/teaching, and lower levels of avoidance than do the fathers. The mothers' perceptions may be a factor of her role in the family structure, as the nurturer and caretaker.

Interestingly, mothers' depart from the rosy picture when they report on their children's' levels of rivalry. Mothers' perceptions of significantly higher levels of rivalry

may be due to her own bias. Mothers' may be more in tuned and bothered by the children's' behaviors such as tattling, jealousy, blaming, taking advantage of, resenting, and competing because mothers' may be more emotionally invested in these behaviors, in the form of increased anxiety over the twins negative behaviors towards each other, i.e. the high levels of aggression coupled with the high levels of rivalry. Possibly the fact that the mother is often viewed as the caretaker and nurturer, the children may be more willing to share their anger, jealousy, blaming and resenting with the mother as a confidant. There is no prior research which looks at the parents' perception of the twin relationship, especially when comparing perceptions of the mother and fathers; therefore this research is exploratory and leaves a great deal to ponder.

While there are some similarities between reporters, the differences are much more noteworthy. The twins' perception of their rivalry level as being lower than as perceived both mother and father suggests that what parents view as rivalry and negative attributes of the twin relationship, the twins may view as simple manners of communication. Overall, it appears that parents and their children have very dissimilar perceptions of the children's relationship, except when given plain evidence of tangible, observable behavior, i.e. aggression.

Although mothers' and fathers' perceptions may actually differ on the constructs of empathy and avoidance, there is also the possibility that the differences are due to the rater bias included in any report measure. Hoyt (2000) notes the high incidence of rater bias. Included in his list of types of rater bias is the fact that rater's interpretation of the scale items or unique reactions to the scale items may affect the results. Therefore, although the multi-reporter format is important in order to gain a more complete picture

of the persons in the twin relationship, the rater bias must be considered when explaining reporter differences.

While other interactions were not hypothesized, the interaction effects which were found are noteworthy. On the constructs of empathy, companionship, directiveness/teaching, rivalry, and aggression, there was an interaction effect of target by reporter. It was found that on the constructs of aggression and rivalry, twins self-reported lower levels of rivalry and aggression on themselves while reporting higher levels of rivalry and aggression when reporting on their co-twin. The opposite occurred on the constructs of empathy, companionship, and directiveness/teaching. On these more positive aspects of the relationship, twins self reported higher levels of empathy, companionship, and directiveness/teaching, while reporting that their sibling had lower levels of empathy, companionship, and directiveness/teaching. There was no target by reporter interaction on the construct of avoidance.

The target by reporter interaction effect suggests that when a person reports on him or herself, they will report more favorably about his or her own behavior when compared to their sibling, i.e. a halo effect. Although an interesting finding, the finding is not surprising due to the fact that persons quiet often either see themselves more positively or at least want others to perceive them more positively, hence the higher self reports on the positive constructs of empathy, companionship, and directiveness/teaching, and the lower self-reports on rivalry and aggression. The possible halo-effect coupled with the potential for rater bias further supports the need for a multiple informant format in order to obtain a more accurate picture of the persons being studied.

Overall, the patterns which develop from exploring the similarities and differences between reporters portray an interesting picture of the family dynamics within the twin family. It is interesting to note that parents' perceptions of the twin relationship do not appear to persuade or dissuade the view of the children. This finding supports Segal's (1982, 1988, 1988) suggestion that parents do not bear the primary responsibility for twins' similarities or how they relate to one another. Overall, Segal found that parents responded to the twins rather than creating behaviors in the twins. Loehlin and Nichole, (1976) also noted that while parents and others may magnify or downplay traits and tendencies of twins, it is the actual twins who are the pivotal persons involved in their development both as individuals and as a pair.

Lastly, it is important to note that while significant differences occur between the MZ and DZss twins' relationships, it is not certain how MZ twins and DZss twins compare to nontwins, in the greater scheme of sibing relationships. While there is no current research which explores MZ versus DZss versus nontwins, one study utilizing the same sample as the current study, found that when comparing the more heterogeneous group of "twins" to nontwins, the twins, overall, ranked higher in the area of the more positive relationship constructs and lower on the more negative constructs (Anderson, 1999) than did the nontwins.

LIMITATIONS AND FUTURE DIRECTIONS

Some limitations in the present study should be noted. First, the fact that the results are based on one measure limits the results to the questions that are specific to the Sibling Inventory of Behavior (Schaefer & Edgerton, 1981). By utilizing only one

measure, the constructs of empathy, companionship, directiveness/teaching, avoidance, rivalry, and aggression are limited. Future studies should include multiple measures that broaden the definition of the constructs included in the present study.

Another methodological limitation of the present student includes the possible bias and lack of generalizability. First, due to the use of a paper and pencil measure, it is possible that the reporters involved may try to minimize or deny particular aspects of the relationship, such as those more negative aspects, i.e. avoidance, aggression, and rivalry. Reporters may also over report qualities such as companionship and empathy.

Another limitation is the fact that the present study limited itself to investigating the differences between MZ twins and DZss twins. In order to investigate the complete gambit of the twin relationship, it is important to include the male-female DZ (DZos) twin dyad.

The present study sample of utilizing twins only, adds another limit to the overall research findings. Although adding nontwins as a comparison group may be difficult due to the fact that nontwin siblings by definition have an age differential, the addition of a nontwin comparison group would add to the understanding of the true differences of the twin relationship. Although the present study can determine the differences between twin groups (MZ vs. DZss), this does not provide information concerning the overall differences in relationships that twins may characterize. Once a more consistent understanding and more complete picture of the twin relationship is developed, then future research should begin to explore how the twin relationship differs from the nontwin relationship.

Another limit of the current study is the lack of an ethnically diverse sample. There may be differences between African American, Caucasian, and Hispanic twin dyads, as well as their parents' perspectives. This researcher did not have a large enough number of under represented minorities to make comparisons between the ethnic groups on the dependent measures.

In reviewing the literature on twin studies, it was found that, overall, there is a paucity of twin research, especially research which incorporates empirical studies, separation of twin types and use of both twins as informants. However, there appears to be a need for an increased understanding of how twins relate and inter-relate. Ainslie (1985) and Farber (1981) suggest that twins constitute their own developmental context. The current study supports this suggestion by finding that the concept of power/status/directiveness/teaching, as defined by sibling researchers (Furman & Buhrmester, (1985); Vandell, Minnnett, & Santrock, 1987) may not be an appropriate or accurate construct for understanding the power within a twin relationship. Therefore, it is imperative, for twins' sake, for us to better understand this development. Therefore more research which explores specifics of the developmental framework for twins would be important.

Also, sibling researchers have found that as siblings mature and develop their relationship changes (Buhrmester, 1992Buhrmester & Furman, 1987, 1990; Cicirelli, 1994b; Vandell, Minnett, and Santrock, 1987). It is hoped that future researchers will examine MZ/DZ twins at various age levels. Information concerning how the maturation of twins affects the twin relationship would be beneficial to understanding twins in their context.

Future research of twins should incorporate the use of various methods and multiple reporters, including an observer's view, in order to shed more light on the experiences of the persons involved in the unique and mysterious relationship of twins, as well as to increase our understanding of people and their relationships.

The importance of continuing to study twins and their families cannot be overstated. Sibling relationships, overall, comprise a salient, long lasting, socialization environment (Furman & Buhrmester, 1982; Lamb & Sutton-Smith, 1982). Siblings can aid in the development of self-disclosure skills (Howe et al., 2001), socio-emotional understanding (Howe et al., 2001; Slomkowski & Dunn, 1992), affective perspective-taking (Howe, 1991; Howe and Ross, 1990), and conflict resolution (Shantz & Hobart, 1989). With the many issues which effect adolescents, including the externalizing behaviors of drug and alcohol use, sexual misconduct, and antisocial behaviors (East & Khoo, 2005; Pomery, Gibbons, Gerrard, Cleveland, Brody, & Wills, 2005); as well as the internalizing issues of depression (Feinberg, Reiss, Neiderhiser, Hetherington, 2005), sibling researchers have begun to more actively explore the role and influence of siblings on each other. It has been found that the closer the siblings, the greater influence of sibling on sibling. This finding supports the idea that twin relationships may be effective on both a positive and/or negative level. Therefore, future studies which explore the internalizing and externalizing behaviors demonstrated by MZ twins and DZ twins would be important to further understanding the twin relationship and how such a relationship can affect psychological functioning.

CONCLUSION

This study investigated the differences between adolescent MZ and DZss twins' quality of relationship on the constructs of empathy, companionship, directiveness/teaching, avoidance, rivalry, and aggression. Gender differences as well as reporter differences were also explored. The study was a multi-informant study which included each twin in the dyad as well as the twins' biological mothers and fathers. Due to the fact that there are no current theories, nor any prior empirical studies exploring the adolescent twin sibling relationship, then the main purpose of the present study was to open the doors and begin dialogue involving the differences between MZ and DZ twins.

Overall, the study found that MZ twins report and demonstrate higher levels of the more positive aspects of empathy, companionship, and directiveness/teaching than DZss twins, while reporting and demonstrating lower levels of the more negative constructs of avoidance, rivalry and aggression. The study also found that female MZ and DZss twins report and demonstrate higher levels of empathy, companionship, directiveness/teaching and lower levels of avoidance than do male MZ and DZss twins. There were no gender differences with regards to rivalry and aggression. Third, the study found that while reporter differences occurred, differences were not between how twins viewed the relationship, but rather how parents viewed the relationship. Also, there was a consistent finding that when reporting on one-self, the twins attributed higher levels of the positive qualities (empathy, companionship) to themselves than to their co-twin. Conversely, when reporting on the negative qualities (avoidance, rivalry, and aggression), twins reported lower levels for themselves than for their co-twin.

The uniqueness of the study to offer perspectives from each twin as well as each parent offers a foundation for building future research which can explore both the twin relationship, as well as the family system which encompasses a twin dyad. Although this study has limitations, for example the reliance on one pen and paper measure, this study offers the beginnings of a framework for understanding the adolescent twin relationship.

Appendix A

As you know, there are two kinds of twins: identical or one egg twins, which have the same heredity, and fraternal or twin egg twins, which have different heredity.
Most of the following questions are intended to help determine which kids you are.

1. What is your hair color? _____ IS your hair different in color, texture, or pattern of growth than that of your twin? _____ In what way? _____
2. What is the color of your eyes? _____ Is your eye color different from that of your twin? _____
   In what way? _____

3. How tall are you? _____ How much taller are you than your twin? _____

4. How much do you weigh? _____ How much heavier or lighter are you than your twin? _____

5. If you know your blood type and RH factor indicate them here _____

6. As a young child did your parents ever mistake you for your twin? (Check one.)

   ___ Yes, frequently
   ___ Occasionally
   ___ Rarely or never

7. Have your parents mistaken you for your twin recently? (Check one.)

   ___ Yes, frequently
   ___ Occasionally
   ___ Rarely or never

8. Have your teachers ever mistaken you for your twin? (Check one.)

___ Yes, frequently
___ Occasionally
___ Rarely or never

9. Have close friends ever mistaken you for your twin? (Check one.)

___ Yes, frequently
___ Occasionally
___ Rarely or never

10. Have casual friends ever mistaken you for your twin? (Check one.)

___ Yes, frequently
___ Occasionally
___ Rarely or never

11. Do you know whether you are a fraternal or identical twin? (Check one.)

____ I know for sure I am an identical twin.

____ I think I am an identical twin.

____ I know for sure I am an fraternal twin.

____ I think for sure I am an fraternal twin.

____ I don't know whether I am an identical twin or a fraternal twin.

12. If you know whether you are 'identical or fraternal,' how do you know? (Indicate how by whom it was determined.)

_____
_____

Appendix B

CHILD 2:

In this section we are asking you to describe how_____(Child 1) and _____(Child 2) behave toward each other.
The first group of items concern_____(Child 1)'s behavior towards (Child 2). For each item, circle the number that shows how often (Child 1) behaves in that way toward _____(Child 2).

How often (Child 1)	Never	Seldom	Some	Often	Always	
1. Is pleased by progress (Child 2) makes	1	2	3	4	5	15/
2. Teases or annoys (Child 2)	1	2	3	4	5	16/
3. Gets angry with (Child 2)	1	2	3	4	5	17/
4. Accepts (Child 2) as a playmate	1	2	3	4	5	18/
5. Is embarrassed to be with (Child 2) in public	1	2	3	4	5	19/
6. Wants (Child 2) to succeed	1	2	3	4	5	20/
7. Stays away from (Child 2) if possible	1	2	3	4	5	21/
8. Gets ideas for things they can do together	1	2	3	4	5	22/
9. Fusses and argues with (Child 2)	1	2		4	5	23/
10. Has fun at home with (Child 2)	1	2	3	4	5	24/
11. Acts ashamed of (Child 2)	1	2	3	4	5	25/
12. Shows sympathy when things are hard for (Child 2)	1	2	3	4	5	26/
13. Frowns or pouts when (Child 2) has to be with (him/her)	1	2	3	4	5	27/
14. Teaches (Child 2) new skills	1	2	3	4	5	28/
15. Helps (Child 2) adjust to a new situation	1	2	3	4	5	29/
16. Treats (Child 2) as a good friend	1	2	3	4	5	

17. Tries to avoid being seen with (Child 2)	1	2	3	4	5 31/
18. Is concerned for (Child 2's) welfare and happiness	1	2	3	4	5 32/
19. Makes plans that include (Child 2)	1	2	3	4	5 33/
20. Hurts (Child 2's) feelings	1	2	3	4	5 34/
21. Tries to comfort (Child 2) when (s/he) is unhappy or upset	1	2	3	4	5 35/
22. Shares secrets with (Child 2)	1	2	3	4	5 36/
23. Babysits and cares for (Child 2)	1	2	3	4	5 37/
24. Tattles on (Child 2)	1	2	3	4	5 38/
25. Is jealous of (Child 2)	1	2	3	4	5 39/
26. Has physical fights with (Child 2) (not just for fun)	1	2	3	4	5 40/
27. Is nosey and has to know .everything about (Child 2)	1	2	3	4	5 41/
28. Tries to teach 2) how to (Child	1	2	3	4	5 42/
29. Takes advantage of (Child 2)	1	2	3	4	5 43/
30. Blames (Child 2) when something goes wrong	1	2	3	4	5 44/
31. Is very competitive against (Child 2) '	1	2	3	4	5 45/
32. Resents (Child 2)	1		3	4	5 46/

Now, please do the opposite. For each item, circle the number that shows how often
(Child 2) behaves in that way toward
(Child 1).

How often (Child 2).....	Never	Seldom	Some Times	Often	Always	
1. Is pleased by progress (Child 1) makes	1	2	3	4	5	15/
2. Teases or annoys (Child 1)	1	2	3	4	5	16/
3. Gets angry with (Child 1)	1	2	3	4	5	17/
4. Accepts (Child 1) as a playmate	1	2	3	4	5	18/
5. Is embarrassed to be with (Child 1) in public	1	2	3	4	5	19/
6. Wants (Child 1) to succeed	1	2	3	4	5	20/
7. Stays away from (Child 1) if possible	1	2	3	4	5	21/
8. Gets ideas for things they can do together	1	2	3	4	5	22/
9. Fusses and argues with (Child 1)	1	2	3	4	5	23/
10. Has fun at home with (Child 1)	1	2	3	4	5	24/
11. Acts ashamed of (Child 1)	1	2	3	4	5	25/
12. Shows sympathy when things are hard for (Child 1)	1	2	3	4	5	26/
13. Frowns or pouts when (Child 1) has to be with (him/her)	1	2	3	4	5	27/
14. Teaches (Child 1) new skills	1	2	3	4	5	28/
15. Helps (Child 1) adjust to a new situation	1	2	3	4	5	29/
16. Treats (Child 1) as a good friend	1	2	3	4	5	30/

How often_____(Child 2)....

	Never	Seldom	Some Times	Often	Always	
17. Tries to avoid being seen with (Child 1)	1	2	3	4	5	31/
18. Is concerned for (Child 1's) welfare and happiness	1	2	3	4	5	32/
19. Makes plans that include (Child 1)	1	2	3	4	5	33/
20. Hurts (Child 1's) feelings	1	2	3	4	5	34/
21. Tries to comfort (Child 1) when (s/he) is unhappy or upset	1	2	3	4	5	35/
22. Shares secrets with (Child 1)	1	2	3	4	5	36/
23. Babysits and cares for (Child 1)	1	2	3	4	5	37/
24. Tattles on (Child 1)	1	2	3	4	5	38/
25. Is jealous of (Child 1)	1	2	3	4	5	39/
26. Has physical fights with (Child 1) (not just for fun)	1	2	3	4	5	40/
27. Is nosey and has to know .everything about (Child 1)	1	2	3	4	5	41/
28. Tries to teach 1) how to (Child	1	2	3	4	5	42/
29. Takes advantage of (Child 1)	1	2	3	4	5	43/
30. Blames (Child 1) when something goes wrong	1	2	3	4	5	44/
31. Is very competitive against (Child 1) '	1	2	3	4	5	45/
32. Resents (Child 1)	1		3	4	5	46/

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